"The manner of an artist is essentially individual, the method of an artist is absolutely universal. The first is personality, which no one should copy; the second is perfection, which all should aim at"

-Oscar Wilde

"I have offended God and mankind because my work did not reach the quality it should have."

-Leonardo da Vinci's dying words, 1519

University of Alberta

Development of a Domain Specific Measure of Perfectionism in Sport

by

John K. Gotwals

A thesis submitted to the Faculty of Graduate Studies and Research in partial fulfillment of the requirements for the degree of Doctor of Philosophy

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Abstract

The purposes of this dissertation are to (a) develop sport-based versions of Frost, Marten, Lahart, and Rosenblate's (1990) doubts about actions and organization subscales, and (b) produce construct validity evidence to support the inclusion of these new subscales in a revised version of Dunn, Causgrove Dunn, and Syrotuik's (2002) *Sport Multidimensional Perfectionism Scale* (Sport-MPS). Efforts to achieve these purposes are presented in a series of phases based upon Messick's (1989) conceptualization of validity. The first phase (Chapters 2 and 3) presents the development of sport-based doubts about actions (DAA-Sport) and organization (ORG-Sport) domain specifications. The second phase (Chapter 4) describes the construction of DAA-Sport and ORG-Sport items and establishes content-related validity evidence for the new items via an analysis of expert judges' ratings of item content relevance and item-set content representativeness. The third phase (Chapter 5) presents structurally-related validity evidence for the DAA-Sport and ORG-Sport subscales through multidimensional scaling (MDS) analyses of 33 elite-level Ultimate Frisbee players' similarity ratings between DAA-Sport items, ORG-Sport items, and Sport-MPS items. Results indicate the unique nature of DAA-Sport and ORG-Sport within the context of original Sport-MPS items. These first three phases indicate that DAA-Sport and ORG-Sport are suitable to be included in a revised version of the Sport-MPS (i.e., the Sport-MPS-2). The fourth phase (Chapter 6) presents an examination of the latent dimensionality of the Sport-MPS-2 through a factor analytic examination of 251 Canadian Intercollegiate Sport student-athletes' responses to the instrument. Results indicate that the Sport-MPS-2 is best represented by six factors (i.e., *Personal Standards*, *Concern Over Mistakes*, *Perceived Parental Pressure*, *Perceived Coach Pressure*,

Doubts About Actions, and *Organization*). The final phase (Chapter 7) establishes external validity evidence for the Sport-MPS-2 through an examination of the relationships between 181 male intercollegiate varsity ice hockey players' Sport-MPS-2 scores and their scores on global perfectionism and competitive trait anxiety measures. Analyses indicate that Sport-MPS-2 subscales are related in theoretically meaningful ways to both measures. The construct validity evidence present in this dissertation provides initial support for including DAA-Sport and ORG-Sport subscales into the Sport-MPS-2 for the purpose of examining perfectionism in sport.

Acknowledgement

I would like to thank my advisor, Dr. John Dunn, for his invaluable guidance over the past six years. The quality of this dissertation is directly related to his efforts to provide me with the most illuminating, educating, and practical graduate experience possible. I would also like to recognize Dr. Nicholas Holt and Dr. Todd Rogers for the important teachings and advice that they provided me with over my doctoral career. Finally, I would like to thank all the coaches and athletes who participated in the studies that comprise this dissertation.

Dedication

I dedicate this dissertation to my parents who have always provided me with the utmost support, patience, and love.

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List of Abbreviations

Abbreviation	Description
Frost-MPS	Frost, Marten, Lahart, and Rosenblate's (1990) Multidimensional Perfectionism Scale
PS-Frost	The personal standards subscale in Frost et al.'s (1990) Multidimensional Perfectionism Scale
COM-Frost	The concern over mistakes subscale in Frost et al.'s (1990) Multidimensional Perfectionism Scale
PE-Frost	The parental expectations subscale in Frost et al.'s (1990) Multidimensional Perfectionism Scale
PC-Frost	The parental criticism subscale in Frost et al.'s (1990) Multidimensional Perfectionism Scale
DAA-Frost	The doubts about actions subscale in Frost et al.'s (1990) Multidimensional Perfectionism Scale
ORG-Frost	The organization subscale in Frost et al.'s (1990) Multidimensional Perfectionism Scale
Hewitt-MPS	Hewitt and Flett's (1991) Multidimensional Perfectionism Scale
Sport-MPS	Dunn, Causgrove Dunn, and Syrotuik's (2002) Sport Multidimensional Perfectionism Scale
PS-Sport	The personal standards subscale in Dunn et al.'s (2002) Sport Multidimensional Perfectionism Scale
COM-Sport	The concern over mistakes subscale in Dunn et al.'s (2002) Sport Multidimensional Perfectionism Scale
PPP-Sport	The perceived parental pressure subscale in Dunn et al.'s (2002) Sport Multidimensional Perfectionism Scale
PCP-Sport	The perceived coach pressure subscale in Dunn et al.'s (2002) Sport Multidimensional Perfectionism Scale
BPS	Burns's (1980) perfectionism scale
EDI-P	The perfectionism subscale in Garner, Olmstead, and Polivy's (1983) Eating Disorder Inventory
EFA	Exploratory factor analysis
PCA	Principal components analysis

List of Abbreviations (Continued)

Abbreviation	Description
PA	Principal axes analysis
SIGEFF	Significant Efforts to Learn and Understand Academic Material
EXPREP	Uncertainty About and Dissatisfaction With Exam Preparation
DAA-Sport	A set of six items designed to assess the doubts about actions perfectionism dimension as represented in sport (also designated as a subscale in the Sport Multidimensional Perfectionism Scale 2)
ORG-Sport	A set of six items designed to assess the organization perfectionism dimension as represented in sport (also designated as a subscale in the Sport Multidimensional Perfectionism Scale 2)
JDM	Rogers's (2001) Judge's Discrepancy from the Median Rating statistic
R_k	The range of the judges' ratings for a particular item or item-set
V.	Aiken's (1985) content validity coefficient
MDS	Multidimensional Scaling
SRS	Similarity Rating Scale
SRS1	A SRS version that contained the item-pairings (n = 66) between the six DAA-Sport items and the six ORG-Sport items
SRS2	A SRS version that contained the item-pairings (n = 153) between the 12 original Sport-MPS subscale marker items and three items each from the DAA-SPORT and ORG-Sport item-sets
SRS3	A SRS version that contained the item-pairings (n = 153) between the same 12 marker items as in SRS2 and the six DAA-Sport and ORG-Sport items that were not utilized in SRS2
R^2	The proportion of variance in a data-set that is accounted for by a multidimensional scaling solution
Sport-MPS-2	The Sport Multidimensional Scale 2
CFA	Confirmatory factor analysis
CTA	Competitive trait anxiety

List of Abbreviations (Continued)

Abbreviation	Description
SCAT	Martens's (1977) Sport Competition Anxiety Test
SAS	Smith, Smoll, and Schutz's (1990) Sport Anxiety Scale
CHWS	Dunn's (1999) Collegiate Hockey Worry Scale
CDAP-Frost	A factor comprised of items from the concern over mistakes and doubts about actions subscales of Frost et al.'s (1990) Multidimensional Perfectionism Scale
PPP-Frost	A factor comprised of items from the parental expectations and parental criticism subscales of Frost et al.'s (1990) Multidimensional Perfectionism Scale
WOR	A factor comprised of items from the worry subscale of Smith et al.'s (1990) Sport Anxiety Scale and the negative social evaluation subscale of Dunn's (1999) Collegiate Hockey Worry Scale
SOM	A factor comprised of items from the somatic anxiety subscale of Smith et al.'s (1990) Sport Anxiety Scale
CD	A factor comprised of items from the concentration disruption subscale of Smith et al.'s (1990) Sport Anxiety Scale
MANOVA	Multivariate Analysis of Variance
PI	Hill et al.'s (2004) Perfectionism Inventory

Chapter 1

An Introduction to the Assessment of Perfectionism within Sport

There is currently dissent among theorists and researchers regarding the best way to define the personality trait of perfectionism (Flett & Hewitt, 2002). This dissension has lead to the propagation of numerous operational definitions of the construct in the literature. However, two components common across most of these definitions reflect the degree to which individuals demand or strive for extremely high standards of performance and are overly concerned about personal mistakes committed in efforts to reach such standards. In the general psychology literature, these tendencies have historically been associated with a wide range of maladaptive cognitions, emotions, and behaviors (Blatt, 1995). Exemplars of maladaptive correlates include suicidal preoocupation (Blatt; Kittler Adkins & Parker, 1996), depression (Hewitt & Flett, 1991), and eating disorders (Vohs et al., 1999). More recently, though, a small body of literature has linked perfectionist orientations to more adaptive constructs including conscientiousness (Hill, McIntyre, & Bacharach, 1997), emotional adjustment (Rice & Lapsley, 2001), and adaptive socio-cultural behavioral tendencies (Parker, 1997).

The functional nature of perfectionism is also unclear within the domain of sport. Flett and Hewitt (2005) recently argued that extreme levels of perfectionism are primarily maladaptive within the domain of sport. These researchers indicated that, while perfect performance is often viewed as a pre-requisite for success in many sports, athletes who consistently demand such an achievement level face a number of negative, unhealthy, and self-defeating outcomes. This claim has been substantiated by studies within sport that have associated athletes' heightened levels of perfectionism with low levels of self-

esteem (Gotwals, Dunn, & Wayment, 2003), elevated levels of athletic burn-out (Gould, Tuffey, Udry, & Loehr, 1996; Gould, Udry, Tuffey, & Loehr, 1996), and trait anger (Dunn, Gotwals, Causgrove Dunn, & Syrotuik, 2006).

Flett and Hewitt (2005) admit that their standpoint regarding the maladaptive nature of perfectionism is challenged by the achievements of many successful elite athletes who adopt a perfectionist orientation in their approach to sport. Professional athletes who have acknowledged their perfectionistic approach to sport include four-time Winston Cup champion Jeff Gordon (Beech, 2003), PGA golfer and 2003 Masters champion Mike Weir (Korobanik, 2003), NFL kicker Mike Vanderjagt (Associated Press, 2003), and NFL Pro Bowl quarterback Carson Palmer (Hobson, 2005). Similarly, Gould, Dieffenbach, and Moffet (2002) identified an apparently adaptive profile of perfectionism among a sample of 10 U.S. Olympic Gold Medalists who had competed at the summer or winter Olympics between 1976 and 1998. Applied sport psychologists have also speculated that there is a link between elite performance in sport and perfectionist tendencies (e.g., Hardy, Jones, & Gould, 1996; Zinsser, Bunker, & Williams, 2006). Hardy et al. went so far as to suggest that "many of the most effective world class athletes are perfectionistic in their orientations" (p. 243).

Flett and Hewitt's (2005) emphasis on the maladaptive nature of perfectionism coupled with their reluctance to recognize the potentially adaptive nature of perfectionism is echoed throughout the psychology literature (see Benson, 2003; Flett & Hewitt, 2002; Greenspan, 2000). Such an orientation towards the academic study of perfectionism may be a result of early conceptualizations of perfectionism which developed out of the clinical psychology domain (Rice, Bair, Castro, Cohen, & Hood, 2003; Stoeber & Otto,

in press). For instance, as a result of their interactions with perfectionists in clinical settings, early psychodynamic-based perfectionism theorists (e.g., Hollender, 1965; Horney, 1951; Missildine, 1963) characterized perfectionism as a clinically neurotic achievement orientation. Indeed, within its description of obsessive-compulsive personality disorder, the *Diagnostic and Statistical Manual of Mental Disorders* (DSM-IV; American Psychiatric Association, 1994) indicates that perfectionism can "cause significant dysfunction and distress" (p. 669).

Clinically-based conceptualizations of perfectionism (Hollender, 1965; Missildine, 1963) typically focus on the perfectionist's tendencies to demand the attainment of a perfect (i.e., flawless) performance and to utilize very organized and systematic approaches in efforts to reach these performance standards. Theorists have also emphasized that perfectionists often feel burdened by these unrealistic standards because they perceive that they are imposed by significant others who are overly critical of the perfectionists' efforts to achieve these standards (Hewitt & Flett, 1991). As such, theorists have argued that perfectionists have a tendency to become overly concerned about mistakes and to doubt the quality of their performances (Blatt). Because perfect performance is so rarely achieved, Burns (1980) suggested that perfectionists develop a fear that such perceived performance failures will occur time and time again which leads perfectionists to feel "anxious, confused, and emotionally drained" in achievement settings (Hamachek, 1978, p. 28).

These descriptions of perfectionism as a dysfunctional construct have served as the framework for perfectionism theory and research for the past 25 years (Stoeber & Otto, in press) resulting in a host of research studies that have focused on the debilitative

and dysfunctional nature of the construct (Stoeber & Otto, in press). Indeed, some researchers have argued that an adaptive view of perfectionism is in conflict with the inherent (maladaptive) definition of the construct (cf. Greenspan, 2000; Hall, 2005). Nevertheless, other perfectionism theorists (e.g., Hamachek, 1978) proposed an alternative conceptualization of perfectionism that recognizes both the maladaptive and adaptive nature of perfectionist orientations (see Stoeber & Otto). Although acknowledging the destructive nature of the clinically-based conceptualization of perfectionism—which Hamachek termed *neurotic perfectionism* (henceforth labeled, *maladaptive perfectionism*)—Hamachek also proposed a healthy form of perfectionism which he termed *normal perfectionism* (henceforth labeled, *adaptive perfectionism*).

Similar to maladaptive perfectionists, adaptive perfectionists set very high standards of personal performance and are very organized and systematic in their efforts to achieve these standards (Hamachek, 1978). However, unlike maladaptive perfectionists, adaptive perfectionists understand that it is inevitable that some mistakes will be committed in efforts to reach their lofty goals. Consequently, adaptive perfectionists do not fear the possibility of mistakes or doubt the quality of their performances to the same degree as maladaptive perfectionists. Hamachek also proposed that adaptive perfectionists desire approval from significant others, but view this approval as "an additional good feeling" (p. 27) on top of the satisfaction and enjoyment that they feel about their efforts to reach their perfect performance. Therefore, adaptive perfectionists do not share maladaptive perfectionists' dependence on, and sensitivity to, social evaluation. As a result of this healthy achievement orientation, falling short of achieving perfect levels of performance has less negative impact upon adaptive

perfectionists' self-worth (as compared to maladaptive perfectionists) and in turn allows them to feel "excited, clear about what needs to be done, and emotionally charged" in achievement settings (Hamachek, p. 28).

In accordance with Hamchek's (1978) conceptualization, merely labeling individuals as "perfectionists" is not adequately descriptive of the wide-ranging functional nature of the trait. Instead, individuals' perfectionistic orientations must be qualified as being representative of maladaptive perfectionism or adaptive perfectionism. Consequently, it is advocated in this dissertation that use of terms such as "perfectionism", "perfectionistic tendencies", or "perfectionistic orientations" should be reserved for reference to the broad categories of characteristics common across the conceptualizations of maladaptive and adaptive perfectionism (e.g., the setting of extremely high standards of personal performance or the degree to which individuals are concerned about personally committed mistakes).

Flett and Hewitt (2002) recently stated that the apparently paradoxical nature of perfectionism reflected by its maladaptive and adaptive correlates represents "the most vexing question in the area [of perfectionism research]" (p. xi). Hamachek's (1978) conceptualization of perfectionism has recently been gaining acceptance in the literature as a useful framework for explaining these maladaptive and adaptive correlates in general life (see Stoeber & Otto, in press). Given that further examination of perfectionistic orientations within the domain of sport has been advocated by researchers studying in both general psychology and sport psychology (e.g., Anshel & Eom, 2003; Dunn, Causgrove Dunn, & Syrotuik, 2002; Flett & Hewitt; Stoeber & Otto), it may also prove beneficial to utilize Hamachek's conceptualization to explain the maladaptive and

adaptive correlates of perfectionism within the sport domain (as evidenced by Dunn et al., 2002 and Dunn, Gotwals, et al., 2006). Therefore, in an effort to advance the understanding of perfectionistic orientations within sport, the present dissertation is grounded within Hamachek's conceptualization of perfectionism. Specifically, this dissertation offers a critical examination of the assessment of perfectionistic tendencies in the competitive sport domain.

A myriad of different self-report instruments have been developed to assess perfectionistic tendencies (see Flett & Hewitt, 2002; Enns & Cox, 2002). The two most widely cited measures of these tendencies were developed independently by Frost, Marten, Lahart, and Rosenblate (1990) and Hewitt and Flett (1991) yet their instruments share the same name: the *Multidimensional Perfectionism Scale*. Frost et al.'s instrument (henceforth labeled as the Frost-MPS) is comprised of 35 items that are divided into six subscales that assess six proposed dimensions of perfectionism: *Personal Standards* (PS-Frost), *Concern Over Mistakes* (COM-Frost), *Parental Criticism* (PC-Frost), *Parental Expectations* (PE-Frost), *Doubts About Actions* (DAA-Frost), and *Organization* (ORG-Frost). The PS-Frost subscale (seven items) reflects the extent to which individuals set extremely high standards of personal performance and place excessive importance on these standards during self-evaluation processes. The COM-Frost subscale (nine items) describes an individual's tendency to equate personally-committed mistakes with failure and to believe that these mistakes cause others to lose respect for one's self. The PE-Frost (five items) and PC-Frost subscales (four items) reflect the degree to which individuals perceive that their parents (a) set excessively high achievement goals for them, and (b) are overly critical in evaluating their achievement efforts. The DAA-Frost subscale (four

items) reflects the degree to which an individual feels dissatisfied with, and uncertain about, the quality of personal performance. The final subscale, ORG-Frost (six items), represents an individual's preference for order and organization. Through factor analysis of two samples of female undergraduate students' (n = 232 and 178) responses to the Frost-MPS, Frost et al. provided evidence that the latent dimensionality of the instrument corresponded directly to these six proposed dimensions of perfectionism. Given that Hamachek's (1978) operationalization of perfectionism is utilized in this dissertation, it is important to note that the six components of perfectionism proposed by Frost et al. correspond very closely to the perfectionistic characteristics represented within Hamachek's conceptualization of perfectionism.

The majority of perfectionism research in sport has employed the Frost-MPS to measure the construct (e.g., Coen & Ogles, 1993, Frost & Henderson, 1990; Gotwals et al., 2003; Gould et al., 2002; Gould et al., 1996; Hall, Kerr, & Matthews, 1998; Koivula, Hassmén, & Falby, 2002). These studies have typically reported acceptable levels of internal consistency (i.e., αs > .70) for the Frost-MPS subscales. Validation studies of the Frost-MPS published in the general psychology literature have also indicated that the instrument's subscales are related in theoretically meaningful ways to other perfectionism measures including Hewitt and Flett's (1991) instrument (see Flett, Sawatzky, & Hewitt, 1995; Frost, Heimberg, Holt, Mattia, & Neubauer, 1993) and Burns's (1980) perfectionism scale (see Frost et al., 1990). Furthermore, the wide-spread use of the Frost-MPS in general psychology has produced compelling "construct, concurrent, and discriminant validity" evidence in support of the assessments provided by the instrument (Enns & Cox, 2002, p. 42).

Hewitt and Flett's *Multidimensional Perfectionism Scale* (Hewitt-MPS: 1991) is composed of three 15-item subscales that measure three proposed dimensions of perfectionism: *Self-Oriented Perfectionism*, *Socially Prescribed Perfectionism*, and *Other-Oriented Perfectionism*. Self-oriented perfectionism assesses individuals' tendencies to set extremely high standards of performance and to be overly stringent during evaluation of performance efforts. The definition of socially prescribed perfectionism is similar to that of self-oriented perfectionism, except that the high standards and stringent evaluations are perceived to be set by significant others (e.g., parents) as opposed to one's self. Other-oriented perfectionism assesses the degree to which individuals set extremely high standards of performance for other people and the extent to which individuals are overly critical of others' performances. Hewitt and Flett reported that independent exploratory factor analyses on 1,106 undergraduate students' and 263 psychiatric patients' responses to the Hewitt-MPS produced solutions that were in direct accordance to the three proposed subscales of the instrument. Again, given that the present dissertation is grounded in Hamachek's (1978) conceptualization of perfectionism, it should be noted that the three subscales of the Hewitt-MPS are proposed to assess some, but not all, of the perfectionistic tendencies identified by Hamachek (1978). Specifically, Hewitt and Flett's three dimensions do not represent maladaptive perfectionists' tendencies to doubt the quality of personal performance and both maladaptive and adaptive perfectionists' desires to maintain a high degree of order and organization in their achievement efforts.

To date, two published studies (i.e., Dunn, Causgrove Dunn, et al., 2006; Dunn, Gotwals, & Causgrove Dunn, 2005) have utilized the Hewitt-MPS to assess perfectionist

orientations among athletes. In these studies the Hewitt-MPS subscales demonstrated adequate levels of internal consistency (i.e., αs > .70) among samples of male high school Canadian football players (n = 138), female figure skaters (n = 121), and intercollegiate varsity athletes (n = 241). Dunn, Causgrove Dunn, et al. also reported that the Hewitt-MPS subscales related in theoretically meaningful ways to a perfectionism instrument that was specific to the sport domain (i.e., Dunn et al.'s [2002] *Sport Multidimensional Perfectionism Scale*). These psychometric and validity results have been mirrored in a large number of clinical-, social-, and personality-psychology studies that have utilized the Hewitt-MPS across diverse samples (e.g., Cox, Enns, & Clara, 2002; Flett et al., 1995; Hewitt & Flett, 1991). Following a review of the extent literature, Enns and Cox (2002) concluded that evidence of the convergent, discriminant, and predictive validity of Hewitt-MPS assessments has been clearly demonstrated across multiple contexts.

As indicated, both Frost et al. (1990) and Hewitt and Flett (1991) provided factor analytic evidence to support the proposed dimensionality of their specific instruments. However, subsequent research has indicated that the internal structure of both the Frost-MPS and the Hewitt-MPS may not be in-line with both instruments' proposed latent structures. For example, although Frost et al. proposed that the Frost-MPS was comprised of six factors, subsequent independent analyses have indicated that the instrument may be best represented by three (e.g., Purdon, Antony, & Swinson, 1999), four (e.g., Harvey, Pallant, & Harvey, 2004; Khawaja & Armstrong; 2005; Stöber, 1998; Stumpf & Parker, 2000), or five factors (e.g., Cheng, Chong, & Wong, 1999; Cox, Enns, & Clara, 2002). Additionally, across these solutions, some of the Frost-MPS items had meaningful loadings on multiple factors (e.g., Harvey et al.; Purdon et al.; Stöber) or had to be

deleted from the item-pool to obtain an adequate solution (e.g., Cox et al.; Khawaja & Armstrong).

The internal structure of the Hewitt-MPS has been examined to a much lesser degree in the extent literature than that of the Frost-MPS. Indeed, an extensive review of the perfectionism literature revealed only one published study (Cox et al., 2002) that has examined the latent dimensionality of the Hewitt-MPS since Hewitt and Flett (1991) published their initial factor analytic results. This is surprising (and somewhat disconcerting from a validation perspective) given the widespread use of the Hewitt-MPS in the perfectionism literature. Cox et al. tested the fit of the proposed three-factor structure of the Hewitt-MPS through independent confirmatory factor analyses of data provided by 412 adult mental health outpatients and 288 undergraduate students. In both analyses, fit indices indicated that the data did not provide a good fit to Hewitt and Flett's proposed model. However, an adequate fit was produced for a three-factor solution when each of the Hewitt-MPS subscales contained only five items each (i.e., 10 items were deleted from each subscale). Given the deletion of two-thirds of the original items, the content representativeness of the retained items must be questioned (see Messick, 1989 for a related discussion).

Given that factor analytic studies of the Frost-MPS and the Hewitt-MPS have called into question the latent structures of the instruments, it must be concluded that neither instrument has impressive evidence supporting their originally proposed structures. The proposed six-factor solution for the Frost-MPS has not been replicated across multiple independent exploratory factor analytic examinations of the instrument (e.g., Cheng et al., 1999; Cox et al., 2002; Harvey et al., 2004; Khawaja & Armstrong,

2005; Purdon et al., 1999; Stöber, 1998; Stumpf & Parker, 2000) and exploratory factor analysis has not been used to examine the latent dimensionality of the entire Hewitt-MPS item-set since Hewitt and Flett's (1991) original examination of the instrument. It is worth noting that neither Frost et al. (1990) nor Hewitt and Flett indicated the criteria they used to determine the number of factors to extract (beyond the use of Cattell's [1978] scree test), reported whether any rotation/transformation techniques were applied to the extracted factors, or actually showed the pattern coefficients of all items across all factors in their respective instrument development papers. Consequently, it is impossible for readers to make informed judgments about the adequacy of the factor solutions reported by the authors (see Fabrigar, Wegener, MacCallum, & Strahan, 1999 or Russell, 2002 for related discussions). This type of information is alarming given that the vast majority of the hundreds of research studies that have utilized these two instruments have adopted the original factor structures proposed by Frost et al. and Hewitt and Flett. The results of the literature reviewed here indicate that both the Frost-MPS and the Hewitt-MPS may require substantial revision before both instruments consistently produce assessments that are in direct accordance to their proposed latent dimensionality.

An additional concern surrounding the use of the Frost-MPS and the Hewitt-MPS to assess perfectionistic orientations within sport contexts pertains to the fact that both instruments assess perfectionism as a global personality trait. That is, both of these instruments were developed on the premise that perfectionism is a personality construct that is pervasive across different life domains and, therefore, should be assessed without reference to situational contexts (Flett & Hewitt, 2002). The validity of using such global assessments of perfectionism to determine perfectionistic orientations specific to a certain

domain (such as sport) has been questioned on theoretical and empirical grounds. For example, numerous perfectionism theorists (e.g., Hollender, 1965; Missildine, 1963; Rhéaume, Freeston, & Ladouceur, 1995; Shafran, Cooper, & Fairburn, 2002; 2003) claim that perfectionism is best conceptualized, measured, and studied as a domain-specific construct. These theorists argue that perfectionism should be conceptualized at a micro level with reference to the specific context in which the trait is operating.

Recent research has also shed some light on the domain specificity issue. For example, Slaney and Ashby (1996) interviewed 37 self-professed or other-designated perfectionists on the nature of their perfectionistic orientations. Evidence supporting the domain-specific nature of perfectionistic tendencies was obtained when almost one third of the respondents (i.e., 7 men and 5 women) stated that their perfectionist tendencies "applied to specific areas of their lives but not all areas" (p. 395). Further support for conceptualizing perfectionism as a domain-specific construct was produced by Mitchelson and Burns (1998) who examined the perfectionist tendencies of career mothers ($N = 67$) across two specific life domains. These working mothers (i.e., mothers who worked at least 25 hours per week and left their children in daycare during the work day) completed versions of the Hewitt-MPS that had been modified to measure perfectionist tendencies at work and at home. Analysis of the participants' responses indicated that the mothers reported greater levels of perfectionism across all three Hewitt-MPS subscales in their orientation toward their lives at work than at home (all $ps < .001$).

Mitchelson and Burns's (1998) results provided direct evidence of the domain-specific nature of perfectionism. However, it was unclear how this sample's levels of global perfectionism compared to their reported levels of domain-specific perfectionism

because Mitchelson and Burns did not assess their participants' levels of global perfectionism. To overcome this limitation, Dunn et al. (2005) examined male and female intercollegiate athletes' ($N = 241$) levels of domain-specific and global perfectionism. Dunn et al. compared the athletes' responses to the original Hewitt-MPS (i.e., a measure of global perfectionism) and two versions of the instrument that had been adapted to measure perfectionism in the domains of sport and academe. Results of this study indicated that the athletes reported greater levels of perfectionism across all three subscales in sport than in academe and life in general (all $ps < .001$). These results provide evidence that domain-specific measures of perfectionism may provide more accurate assessments of perfectionistic tendencies within specific contexts in comparison to global measures of perfectionism (such as the Frost-MPS and the Hewitt-MPS).

A self-report instrument designed to provide domain-specific assessments of perfectionism is Dunn et al.'s (2002) *Multidimensional Perfectionism Scale- Football* (since renamed the *Sport Multidimensional Perfectionism Scale* [Sport-MPS] by Dunn, Causgrove Dunn, et al., 2006).[1] As indicated by its title, the Sport-MPS is designed to assess perfectionistic characteristics specific to the domain of sport. The Sport-MPS was based on Frost et al.'s (1990) global conceptualization of perfectionism as assessed by the Frost-MPS. Specifically, Dunn et al. (2002) developed items for the Sport-MPS that were designed to assess sport-specific versions of the Frost-MPS *personal standards*, *concern*

[1] Anshel and Eom (2003) also developed a self-report perfectionism instrument that was designed to assess perfectionist orientations specific to the domain of sport. However, as argued by Dunn, Causgrove Dunn, et al. (2006), the existing evidence indicates that Dunn et al.'s (2002) *Sport Multidimensional Perfectionism Scale* (Sport-MPS) demonstrates better psychometric properties (re: factor structure) than Anshel and Eom's instrument. Additionally, there is currently considerably more external validity evidence in support of Sport-MPS assessments (e.g., Dunham, 2002; Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Dunn & Gotwals, 2005; Dunn, Gotwals, et al., 2006; Vallance, Dunn, & Causgrove Dunn, in press) than there is for assessments produced by Anshel and Eom's instrument. As a result, this dissertation focuses on the development of the Sport-MPS.

over mistakes, *parental criticism*, and *parental expectations* subscales. Dunn et al. (2002) also developed items to assess the degree to which athletes' perceived their coaches as sources of social pressure. To examine the latent dimensionality of the Sport-MPS, Dunn et al. (2002) conducted an exploratory factor analysis (EFA) of 174 male teenage high school Canadian Football players' responses to the Sport-MPS (*M* age = 18.24 years). The final solution in this analysis contained four factors with all items demonstrating excellent simple structure (Thurstone, 1947). Dunn et al. (2002) labeled these four factors *personal standards* (PS-Sport), *concern over mistakes* (COM-Sport), *perceived parental pressure* (PPP-Sport), and *perceived coach pressure* (PCP-Sport). The characteristics represented by these four subscales correspond directly to several perfectionistic characteristics reported by Hamachek (1978).

The subscales of the Sport-MPS have repeatedly demonstrated adequate levels of internal consistency (see Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Dunn, Gotwals, et al., 2006; Vallance et al., in press). Similar to the Frost-MPS and the Hewitt-MPS, a considerable amount of external validity evidence (Messick, 1989) has been produced to support the use of the Sport-MPS as a measure of sport-based perfectionism. For example, theoretically meaningful relationships have been reported between Sport-MPS subscales and Hewitt-MPS subscales (Dunn, Causgrove Dunn, et al., 2006), sport achievement motivation orientations (Dunn et al., 2002), and competitive anger (Dunn, Gotwals, et al., 2006; Vallance et al., in press).

In contrast to the Frost-MPS and the Hewitt-MPS, Dunn et al.'s (2002) proposed factor structure for the Sport-MPS has been supported across multiple exploratory factor analytic examinations of the latent dimensionality of the instrument. For example, Dunn

and colleagues (Dunn, Causgrove Dunn, et al., 2006) examined the stability of the factor solution obtained by Dunn et al. (2002) by conducting exploratory factor analyses on three independent samples' responses to the Sport-MPS. These three samples were comprised respectively of male Canadian Football players (n = 276, M age = 18.29 years, SD = 0.73), male youth ice hockey players (n = 229, M age = 14.15 years, SD = 1.03), and male and female intercollegiate team-sport athletes (n = 221, M age = 21.45 years, SD = 2.29). The factor analytic results identified the same four factors obtained in Dunn et al.'s (2002) original scale construction study (with minor variations in factor structures). Dunn, Causgrove Dunn, et al. (2006) concluded that the latent structure of the original Sport-MPS is quite robust across samples. This contrast between the degree of support for the latent dimensionality of the Sport-MPS in comparison to that of the Frost-MPS and the Hewitt-MPS, combined with the fact that the Sport-MPS provides domain-specific assessments of perfectionism (while the Frost-MPS and the Hewitt-MPS provide global assessments of perfectionism), indicates that the Sport-MPS may be a better instrument of choice than the Frost-MPS or Hewitt-MPS when attempting to assess sport-based perfectionism.

There may be reason, though, to question the degree to which the Sport-MPS provides assessments that are fully representative of perfectionism. As indicated earlier, the Sport-MPS was originally based upon the proposed subscale structure of the Frost-MPS. However, Dunn et al. decided not to develop items designed to assess two of the perfectionism dimensions proposed by Frost et al. (1990)—namely, the dimensions of Organization and Doubts About Actions (see Dunn, Gotwals, et al., 2006). The characteristics represented by these two dimensions are identified as core components of

perfectionism by Hamachek (1978). Thus, it is questionable whether the four factors of the Sport-MPS adequately cover the entire content domain of maladaptive and adaptive perfectionism in sport as conceptualized by Hamachek with respect to global perfectionism.

Frost et al. (1990) defined the organization dimension of perfectionism as an "overemphasis on precision, order, and organization" (p. 451) and conceptualized doubts about actions as the tendency to feel uncertain about and dissatisfied with the degree to which personal tasks are completed to satisfactory levels. Including Hamachek (1978), numerous perfectionism theorists (e.g., Burns, 1980; Hollender, 1965; Missildine, 1963) have alluded to the characteristics that are reflected in Frost et al.'s operationalization of organization and doubts about actions. Regarding organization, Hamachek described the perfectionist as "a person who sets out to be more precise and meticulous, neater, tidier, and usually more organized" than others (p. 30), Hollender indicated that perfectionists can be "fussy and exacting" (p. 96), and Missildine stated that perfectionists "pursue…work methodically, systematically, and strenuously, with meticulous attention to detail" (p. 85). Regarding doubts about actions, Hamachek argued that many perfectionists "stew endlessly in emotional juices of their own brewing about whether they're doing [a task] just right" (p. 27). Similarly, Burns stated that the perfectionist "has trouble sensing when the point of diminishing returns has been reached and when a task should be considered complete" (p. 38).

When developing the Sport-MPS, Dunn et al. (2002) did not include the DAA-Frost and ORG-Frost subscales in the Sport-MPS due to psychometric and conceptualization concerns surrounding these subscales. Specifically, Dunn et al. (2002)

indicated that they did not develop a sport-specific version of the DAA-Frost subscale because Hall et al. (1998) had trouble obtaining adequate levels of internal consistency for these items in their study of perfectionism in high school runners (n = 119). The fact that only one (i.e., Gotwals et al., 2003) of the remaining six studies (i.e., Coen & Ogles, 1993, Frost & Henderson, 1990; Gould et al., 2002; Gould, et al., 1996; Hall et al., 1998; Koivula et al., 2002) that utilized the Frost-MPS to assess athletes' perfectionist orientations actually reported an alpha level for the DAA-Frost subscale (i.e., α = .70) provides tentative support for Dunn et al.'s (2002) concerns regarding the internal consistency of the subscale.

In regards to the ORG-Frost subscale, Dunn et al. (2002) justified their decision not to include the subscale in the Sport-MPS because Frost et al. (1990) had questioned the centrality of organization to perfectionism. Specifically, Frost et al. contended that organization did "not appear to be a core component of perfectionism" (1990, p. 465) based on their finding that the ORG-Frost subscale did not correlate highly with a composite Frost-MPS score (r = .23, p < .01), Burns's (1980) perfectionism scale (r = .18, p > .05), or the perfectionism subscale of Garner, Olmstead, and Polivy's (1983) *Eating Disorders Inventory* (r = .14, p > .05). However, it is questionable whether any of these three measures represent adequate criteria upon which to base such a conclusion.

The composite Frost-MPS score utilized by Frost et al. (1990) was calculated through summation of participants' responses to all of the items in the instrument. However, Stumpf and Parker (2000) questioned the validity of this composite score by indicating that "it makes little sense to combine the scores on the [Frost-]MPS subscales into one global indicator of perfectionism" (p. 849) given the multidimensional nature of

the construct. Along these same lines, both Burns's perfectionism scale (BPS: 1980) and the perfectionism subscale of the eating disorders inventory (EDI-P) contradict contemporary views of perfectionism by conceptualizing perfectionism as a unidimensional construct. Additionally, very little psychometric evidence has been produced to support these instruments' unidimensional treatment of perfectionism. Therefore, one could question whether composite Frost-MPS scores or the assessments produced by the BPS and the EDI-P are good criteria to use in the construct validation process (see Messick, 1989). These construct validation concerns in combination with theorists' claims regarding the centrality of organization to perfectionism (Hamachek, 1978; Hollender, 1965; Missildine, 1963) indicate that Frost et al. may have been misguided in stating that organization did not represent a central component of perfectionism. Therefore, Dunn et al. (2002) may also have been misguided in using Frost et al.'s position to justify the exclusion of organization from the Sport-MPS.

Dunn et al. (2002) also indicated that they did not include versions of DAA-Frost and ORG-Frost items (as presented in Table 1-1) in the Sport-MPS because they thought that inclusion of such items may have jeopardized the face validity of the instrument. Dunn et al. noted that the instructions in the Sport-MPS inform respondents that the purpose of the scale is "to identify how players view certain aspects of their competitive experiences in sport." Dunn et al. developed many items in the Sport-MPS to fit this purpose by adapting original Frost-MPS items to the sport domain (see Table 1-2). For example, the original COM-Frost item which read "I should be upset if I make a mistake" was adapted to read "I should be upset if I make a mistake *in competition*." Dunn et al. argued that using similar methods to adapt original items from the ORG-Frost and DAA-

Table 1-1

Original Items from the Organization and Doubts About Actions Subscales of the Frost-MPS

Subscale	Item Number	Full Item Descriptions
Organization	2	Organization is very important to me.
Organization	7	I am a neat person.
Organization	8	I try to be an organized person.
Organization	27	I try to be a neat person.
Organization	29	Neatness is very important to me.
Organization	31	I am an organized person.
Doubts About Actions	17	Even when I do something very carefully, I often feel that it is not quite right.
Doubts About Actions	28	I usually have doubts about the simple everyday things I do.
Doubts About Actions	32	I tend to get behind in my work because I repeat things over and over.
Doubts About Actions	33	It takes me a long time to do something "right".

Table 1-2

Common Items Across Both the Frost-MPS and Sport-MPS

Instrument			
Frost-MPS		Sport-MPS	
Item Number	Item Description	Item Number	Item Description
4	If I do not set the highest standards for myself, I am likely to end up a second-rate person.	1	If I do not set the highest standards for myself in my sport, I am likely to end up a second-rate player.
18	I hate being less than the best at things.	6	I hate being less than the best at things in my sport.
6	It is important to me that I be thoroughly competent in everything that I do.	14	It is important to me that I be thoroughly competent in everything I do in my sport.
30	I expect higher performance in my daily tasks than most people.	16	I think I expect higher performance and greater results in my daily sport-training than most players.
24	Other people seem to accept lower standards from themselves than I do.	19	I feel that other players generally accept lower standards for themselves in sport than I do.
19	I have extremely high goals.	28	I have extremely high goals for myself in my sport.
12	I set higher goals than most people.	30	I set higher achievement goals than most athletes who play my sport.
14	If I fail partly, it is as bad as being a complete failure.	2	Even if I fail slightly in competition, for me, it is as bad as being a complete failure.
9	If I fail at work/school, I am a failure as a person.	7	If I fail in competition, I feel like a failure as a person.
34	The fewer mistakes I make, the more people will like me.	12	The fewer mistakes I make in competition, the more people will like me.
10	I should be upset if I make a mistake.	21	I should be upset if I make a mistake in competition.

Table 1-2 (Continued)

Instrument			
Frost-MPS		Sport-MPS	
Item Number	Item Description	Item Number	Item Description
13	If someone does a task at work/school better than I, then I feel like I failed the whole task.	24	If a team-mate or opponent (who plays a similar position to me) plays better than me during competition, then I feel like I failed to some degree.
25	If I do not do well all the time, people will not respect me.	27	If I do not do well all the time in competition, I feel that people will not respect me as an athlete.
21	People will probably think less of me if I make a mistake.	32	People will probably think less of me if I make mistakes in competition.
1	My parents set very high standards for me.	3	My parents set very high standards for me in my sport.
22	I never felt like I could meet my parents' expectations.	5	In competition, I never feel like I can quite meet my parents' expectations.
15	Only outstanding performance is good enough in my family.	8	Only outstanding performance during competition is good enough in my family.
26	My parents have always had higher expectations for my future than I have.	11	My parents have always had higher expectations for my future in sport than I have.
3	As a child, I was punished for doing things less than perfect.	15	I feel like I am criticized by my parents for doing things less than perfectly in competition.
35	I never felt like I could meet my parents' standards.	22	In competition, I never feel like I can quite live up to my parents' standards.
20	My parents have expected excellence from me.	25	My parents expect excellence from me in my sport.

Table 1-2 (Continued)

Instrument			
Frost-MPS		Sport-MPS	
Item Number	Item Description	Item Number	Item Description
5	My parents never tried to understand my mistakes.	31	I feel like my parents never try to fully understand the mistakes I make in competition.
11	My parents wanted me to be the best at everything.	33	My parents want me to be better than all other players who play my sport.

Frost subscales (e.g., "I am a neat person" and "I tend to get behind in my work because I repeat things over and over", respectively) to fit the sport domain and then include such items in the Sport-MPS may have given respondents reason to question the stated purpose of the instrument. This, in turn, could have affected the care with which participants responded to the items in the instrument (Dunn et al.).

The difficulty of adapting the ORG-Frost and DAA-Frost items to the sport domain should not be used as the sole justification for excluding these dimensions from perfectionism measures in sport. Because Hamachek (1978) claimed that the characteristics represented by organization and doubts about actions are central components of perfectionism, this dissertation posits that the degree to which Sport-MPS assessments represent perfectionism within the domain of sport would be enhanced if the instrument also assessed these dimensions. As a result, adding contextually-relevant organization and doubts about actions subscales to the Sport-MPS may ultimately assist researchers, clinicians, and coaches to more fully understand the complex nature of perfectionism within the sport domain. Therefore, the first purpose of this dissertation was to develop items to assess organization and doubts about actions in a sport-specific context and to add these items to the original Sport-MPS.

Including such items in the Sport-MPS would result in a revised version of the instrument. Psychometricians advocate that construct validation should be rigorously pursued for the assessments provided by refined instruments (cf. Clark & Watson, 1995; Foster & Cone, 1995; Smith & McCarthy, 1995). Thus, the second purpose of this dissertation was to produce construct validity evidence to support (a) the inclusion of the new doubts about actions and organization items into a revised version of the Sport-MPS,

and (b) the use of this modified inventory for the purpose of assessing perfectionist orientations in sport.

The validation efforts pertaining to the two purposes of this dissertation are presented in a series of phases that mirror Messick's (1989) unified validity framework. This framework is "unified" because it is based on the assumption that there are not different types of validity (e.g., content validity, construct validity, criterion validity). Instead, Messick proposed that construct validity subsumed all the other "types" of validity and, thus, all validity was essentially construct validity. Messick operationalized validity as an evaluative judgment that "refers to the degree to which empirical evidence and theoretical rationales support the adequacy and appropriateness of interpretations and actions based on test scores" (1989, p. 13). There are several critical points inherent within this operationalization. The first is that validity refers not to tests or instruments themselves, but to inferences that are based upon the scores or assessments produced by these tests or instruments. A second major point is the understanding that establishing the validity of a test score inference is a never-ending process that is based on the continual accumulation of validity evidence. Finally, estimating the validity of a test score inference may not be stable across different contexts because the appropriateness of making such estimations may change depending on the value implications and social consequences inherent within different specific contexts. The reader is referred to Messick's (1989) seminal chapter for a more detailed account of this validity conceptualization.

In presenting this conceptualization of validity, Messick (1989) highlighted the different types of evidence upon which judgments of the validity of test score inferences

could be based. The methods used to produce these types of validity evidence vary between descriptive examinations of content, analytical examinations of inherent structure, and the specific testing of theoretically derived hypotheses. This dissertation is comprised of five phases that are focused on producing a sample of these different types of evidence. In the first phase of this dissertation (Chapters 2 and 3) the domain specifications of the organization and doubts about actions dimensions of perfectionism are re-examined to determine how the characteristics represented by these dimensions may be represented in sport. The second and third phases of this dissertation (Chapters 4 and 5) uses these domain specifications to guide the creation of new sport-based DAA and ORG items and presents initial efforts to establish content-related and structurally-related validity evidence for these newly developed items. The fourth phase of the dissertation (Chapter 6) presents an initial examination of the latent-dimensionality of the revised instrument that contains the new doubts about actions and organization items along with the original Sport-MPS items. Finally, the fifth phase of this dissertation (Chapter 7) establishes external validity evidence for this revised version of the Sport-MPS. It is hoped that the information produced from these phases provides an evidential-basis for the use of the revised instrument as a measure of perfectionist orientations within the domain of sport.

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Chapter 2

The Development of Domain Specifications for a Sport-Based Version of the Organization Dimension of Perfectionism

The overall purpose of this chapter was to present a re-examination of the domain specifications of the organization dimension of perfectionism to guide the later creation of new items that represent this dimension in sport. Given that "domain specifications serve as a blueprint or guide for what kinds of items should be constructed for inclusion in [an inventory]" (Messick, p. 37), it is important to return to theorists' original conceptualizations of perfectionism (e.g., Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963) before attempting to construct sport-based organization items.

As indicated in Chapter 1, early theorists (Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963) described perfectionists as people who were precise, meticulous, neat, tidy, organized, methodical, systematic, and detail-oriented. As a result of these descriptions, Frost, Marten, Lahart, and Rosenblate (1990) operationalized organization as an overemphasis on precision and order. Qualitative research of perfectionist characteristics (Rice, Bair, Castro, Cohen, & Hood, 2003; Slaney & Ashby, 1996; Slaney, Chadha, Mobley, & Kennedy, 2000) both supports and clarifies this definition. For example, Slaney and Ashby (1996) interviewed 32 self-described perfectionists and another five individuals who had been identified as perfectionists by significant others. One question in these interviews focused on whether the participants felt that being neat, orderly, and efficient characterized their perfectionistic orientations. The participants' overall affirmative responses to this question lead Slaney and Ashby to declare that "being neat, orderly, and efficient [is] basic to perfectionism" (p. 597). This

finding was replicated in Slaney et al.'s (2000) qualitative examination of five self-described perfectionists who were either graduate students or faculty members at the University of Delhi in India. Qualitative interviews with these participants revealed that being neat, orderly, and efficient was central to their perfectionist achievement efforts.

Two of the self-described perfectionists in Slaney et al.'s (2000) study qualified their preference for organization stating that they developed and used plans to help them achieve their desired levels of order, efficiency, and achievement. For example, one of these self-described perfectionists stated, "I am very clear and thorough about the work I do… very planned, orderly" and that "whatever I plan I complete" (p. 23). This participant noted that these characteristics exemplified the essence of his perfectionism. These results were corroborated in Rice et al.'s (2003) qualitative examination of nine undergraduate students who represented a wide range of perfectionist orientations. Each of these students was interviewed and asked to describe perfectionism or perfectionists. A recurring theme that emerged from these interviews reflected perfectionists' "need for planning" (p. 50). These results indicate that perhaps the tendency to make and adhere to plans to govern achievement efforts may be a relevant component of perfectionism and central to the operational definition of the organization dimension.

Research in sport psychology has indicated that the tendency to develop plans is also a characteristic of many elite athletes (see Krane & Williams, 2006) and that this tendency may be linked to perfectionist orientations. For example, examination of interviews conducted by Orlick and Partington (1988) with Canadian Winter Olympians revealed that the most successful athletes followed pre-competition and competition plans. Similarly, Gould, Dieffenbach, and Moffet (2002) interviewed 10 U. S. Olympic

Gold Medalists (6 males and 4 females) and significant others in these athletes' lives (e.g., coaches, parents, siblings, and/or spouses) to determine the psychological characteristics that contributed to the athletes' success. A consistent theme that emerged from the interviews was the athletes' routine-oriented nature.

The athletes in Gould et al.'s (2002) study also completed Frost et al.'s *Multidimensional Perfectionism Scale* (Frost-MPS: 1990). The mean subscale score for the sample on the 6-item organization subscale of the Frost-MPS was 23.9 ($SD = 4.01$) with individual scores ranging from 18-30. Given that composite scores on the organization subscale can range from 6 to 30, these athletes' scores on this subscale (on average) appear to be quite high. It is possible that the ability of these Olympic champions to develop and follow pre-performance and competition plans may have been a function of their need for organization. As a result, it is suggested in this dissertation that the operational definition of organization (as it pertains to perfectionism in sport) should represent athletes' tendencies to develop and follow pre-competition and competition plans. As indicated earlier, such a definition would be in keeping with numerous theorists' (Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963) descriptions of perfectionists as individuals who are methodical and systematic in their approach to tasks. Therefore, for the purposes of guiding the construction of sport-specific organization items, organization in sport was operationalized as *athletes' tendencies or desires to establish and implement plans or routines that dictate their behavior prior to and during competition in their primary sport*.

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Chapter 3

The Development of Domain Specifications for a Sport-Based Version of the Doubts About Actions Dimension of Perfectionism

The overall purpose of this chapter is to present a re-examination of the domain specifications of doubts about actions that will guide the later development of sport-based doubts about actions items. Given that "domain specifications serve as a blueprint or guide for what kinds of items should be constructed for inclusion in [an inventory]" (Messick, p. 37), it is important to return to theorists' original conceptualizations of perfectionism (e.g., Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963) before attempting to construct sport-based organization items.

Frost, Marten, Lahart, and Rosenblate (1990) based their original conceptualization of doubts about actions on perfectionism theorists' contention that perfectionists have trouble determining when satisfactory levels of personal performance on tasks have been achieved (Burns, 1980; Hamachek, 1978; Missildine, 1963). Specifically, Frost et al. (1990) defined the doubts about actions dimension of perfectionism as the degree to which individuals feel uncertain about, and dissatisfied with, the quality of their performance in personally undertaken tasks. Support for this definition was produced in a recent qualitative examination of perfectionism (Rice, Bair, Castro, Cohen, & Hood, 2003). Rice et al. used responses to Frost et al.'s *Multidimensional Perfectionism Scale* (Frost-MPS: 1990) to separate a sample of undergraduate students into groups of perfectionists and non-perfectionists. In subsequent interviews, Rice et al. asked six of the perfectionists and three of the non-perfectionists to describe perfectionism. These individuals consistently associated perfectionism with a

chronic state of dissatisfaction with one's own performances.

Further examination of Frost et al.'s (1990) conceptualization of doubts about actions reveals the presence of two underlying components. That is, as conceptualized by Frost et al., doubts about actions is purported to represent both *uncertainty about* and *dissatisfaction with* the quality of one's performance in personally undertaken tasks. For example, Frost et al. indicated that doubts about actions is characterized both by "a vague sense of doubt about the quality of one's performance" (p. 451) and by "the tendency to feel that projects are not completed to satisfaction" (p. 453). Both of these components are represented in the items that comprise the DAA-Frost subscale (e.g., "I usually have doubts about the simple everyday things I do" and "Even when I do something very carefully, I often feel that it is not quite right": see Table 1-1 in Chapter 1).

Conceptually, it is unclear whether these two components of doubts about actions are commensurable. Uncertainty towards personal performance is indicative of a sense of doubt about the quality of performance. In contrast, being dissatisfied with personal performance is indicative of a very specific evaluative attitude (i.e., a lack of doubt) towards the quality of performance. As a result, it is unclear whether being uncertain about, and being dissatisfied with, personal performance represent one or two distinct constructs. It is also unclear whether one of these potential components is more central to doubts about actions than the other. Examination of these issues is important given that it would help to determine domain specifications for doubts about actions that could guide the development of sport-based doubts about actions items (cf. Messick, 1989) for inclusion in the *Sport Multidimensional Perfectionism Scale* (Sport-MPS: Dunn, Causgrove Dunn, & Syrotuik, 2002). Therefore, a pilot study was conducted with the

purposes of (a) determining if individuals distinguish between being uncertain about, and being dissatisfied with, personal performance, and (b) examining the relationships between these constructs and the original doubts about actions subscale contained within the Frost-MPS.

Method

Participants

The academic domain (as opposed to the sport domain) was chosen as the context in which to conduct this study due to the relative ease of obtaining an adequate-sized sample of students (in comparison to obtaining a similarly-sized sample of athletes). Participants in this study were 223 male and female (n = 59 and 164 respectively) undergraduate students from a Canadian university who were taking an introductory health education class. The students ranged in age from 18.00 to 47.83 years (M age = 20.90 years, SD = 3.50) and had been in university for an average of 2.24 years (SD = 1.57).

Measures

Participants completed a demographic questionnaire and a modified version of the Frost-MPS. The demographic inventory asked the students to indicate their gender, age, and year in university.

Modified version of the Frost-MPS. The original Frost-MPS (Frost et al., 1990) contains 35 items that measure *Personal Standards* (PS-Frost: 7 items), *Concern Over Mistakes* (COM-Frost: 9 items), *Doubts About Actions* (DAA-Frost: 4 items), *Parental Criticism* (PC-Frost: 4 items), *Parental Expectations* (PE-Frost: 5 items), and *Organization* (ORG-Frost: 6 items). Respondents indicate their level of agreement to

each item on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Higher composite subscale scores represent higher levels of the construct measured by each respective dimension. Validation studies of the Frost-MPS have indicated that its subscales are related in theoretically meaningful ways to other perfectionism measures including Hewitt and Flett's (1991) *Multidimensional Perfectionism Scale* (see Frost, Heimberg, Holt, Mattia, & Neubauer, 1993) and Burns's (1980) perfectionism inventory (see Frost et al., 1990). As noted previously in Chapter 1, Enns and Cox (2002) recently stated that the Frost-MPS is one of the "most widely studied and used measures of perfectionism" (p. 46) and that there is compelling construct validity evidence supporting assessments provided by the instrument.

As described in Chapter 1, a number of researchers have recently provided empirical evidence supporting a domain-specific view of perfectionism (e.g., Dunn, Gotwals, & Causgrove Dunn, 2005; Mitchelson & Burns, 1998). Therefore, given that all the participants in the present study were undergraduate students, the items in the present version of the Frost-MPS were adapted to the scholastic domain. For instance, the item in the original DAA-Frost subscale which read "Even when I do something very carefully, I often feel that it is not quite right" was re-written as, "Even when I do something very carefully at school, I often feel that it is not quite right." However, three items from the ORG-Frost subscale ("I am a neat person", "I try to be a neat person", and "Neatness is very important to me") were not easily adapted to fit the domain of academe. As a result, these items were not included in the present version of the Frost-MPS.

The version of the Frost-MPS that was used in this study also contained six new items (developed by the researcher) that were designed with the intention of assessing

uncertainty about personal performance in the academic domain and six new items that were designed with the intention of assessing *dissatisfaction* with personal performance in the academic domain (see Table 3-1). These items were developed through careful consideration of how these constructs, as potential components of the doubts about actions dimension of perfectionism (cf. Burns, 1980; Frost et al., 1990; Hamachek, 1978), could be represented within the academic domain. As indicated earlier, perfectionism theorists (e.g., Burns; Hamachek) propose that perfectionists' tendencies to be uncertain about, and dissatisfied with, the quality of their achievement efforts on a task leads them to work endlessly on these projects. In reference to this description, it was decided that the items should focus on situations in the academic domain in which students had relatively unrestricted amounts of time to prepare for personally evaluated performances. One such situation involves students' study efforts to learn material in preparation for exams. As a result, an initial pool of items was designed around this context. This item-pool was then edited into the two six-item sets presented in Table 3-1. Six items were included in each item-set because this represents the higher-end value of the number of variables that should ideally load onto a single factor following factor analytic procedures (Gorsuch, 2003). With the inclusion of these 12 new items (and the removal of three original ORG-Frost items), the final version of the Frost-MPS that was utilized in this study contained 44 items (see Appendix A).

Procedures

Clearance to conduct the study was granted by the Human Research Ethics Committee of the Faculty of Physical Education and Recreation at the University of Alberta. Data collection took take place at the start of a regularly scheduled class. At this time the

Table 3-1

Items Proposed to Represent Uncertainty About, or Dissatisfaction With, Personal Performance in the Academic Domain

Intended domain	Full item descriptions
Uncertainty	I usually feel unsure about the adequacy of my exam study habits.
Uncertainty	I usually have trouble deciding when I have studied enough for an exam.
Uncertainty	I usually expend extra effort studying a certain topic because I am not sure if I understand the material well enough.
Uncertainty	I usually study for long periods of time because I have doubts about whether or not I know the subject well enough.
Uncertainty	I usually expend extra effort studying a certain topic because I am not sure if I understand the material well enough.
Uncertainty	When I study I usually examine a certain topic over and over again because I am uncertain whether I have learned the material well enough.
Dissatisfaction	I rarely feel that I have done sufficient studying in preparation for an exam.
Dissatisfaction	I rarely feel fully prepared for an exam.
Dissatisfaction	I rarely feel satisfied with my exam study habits.
Dissatisfaction	When I study I usually examine a certain topic over and over again because I'm convinced that I haven't learned the subject well enough.
Dissatisfaction	I usually expend extra effort studying a certain topic because I am convinced that I do not satisfactorily understand the material.
Dissatisfaction	I usually study for long periods of time because I do not feel that I satisfactorily understand the subject.

researcher instructed students that the general intent of the study was to "examine the extent to which undergraduate students have perfectionistic orientations towards their accomplishments in school." The students were told that (a) participation in the study was voluntary and in no way would relate to their treatment by the professor, (b) any information provided would remain confidential, and (c) that the professor of the class would not be present while the questionnaires were being completed. Written consent was then obtained from all the students who agreed to participate in the study. Participants completed the demographic questionnaire followed by the perfectionism inventory. On average, students completed the two instruments in approximately 15 minutes.

Results

Factor Structure of the Items Designed to Measure Uncertainty About, and Dissatisfaction with, Personal Performance

Box's test of the equality of covariance matrices was conducted upon female and male participants' responses to the six items designed to measure uncertainty about personal performance and the six items designed to measure dissatisfaction with personal performance to determine whether the covariance matrices of females' and males' responses on the 12 newly constructed items significantly differed. This test produced a non-significant test-statistic (Box's $M = 106.525$, $F\,[78, 40480.080] = 1.256$, $p > .05$). As a result, female and male responses to the 12 items were combined into a single dataset for factor analytic purposes.

Exploratory factor analysis (EFA) was used to examine the latent dimensionality of these 12 items. A principal components analysis (PCA) was conducted to help

determine the number of factors. This analysis produced two eigenvalues (λ) > 1.0 (λ_1 = 5.02, λ_2 = 3.01). Results from a parallel analysis (Lautenschlager, 1989) in conjunction with Cattell's (1968) scree criteria (see Figure 3-1) suggested the retention of two factors. These two factors accounted for a total of 60.48% of the variance in the data. Following the recommendation of Tabachnick and Fidell (1996), a principal axes (PA) analysis was then used to extract two factors from the data. The two factors were subjected to orthogonal (varimax) and oblique (direct oblimin [delta = 0]) rotations. The factor structures of the two factors in both resulting solutions were very similar. Additionally, all 12 items displayed excellent simple structure in each solution (i.e., each item had a pattern coefficient $\geq |.30|$ on only one factor [Thurstone, 1947]). Given the theoretical assumption that there would be a degree of correlation between any dimensions underlying these items, the transformed oblique solution was chosen to represent the latent dimensionality of the items.

Examination of the pattern matrix (Table 3-2) reveals that the factor structure of the academic uncertainty and dissatisfaction items differed considerably from what was expected. Of the six items that loaded on the first factor (F_1), three were originally intended to assess uncertainty about personal performance and three were originally intended to assess dissatisfaction with personal performance. Examination of the content of the items in F_1 reveals that each item refers to students' significant study efforts due to uncertainty about, and dissatisfaction with, their ability to learn and understand academic material. As a result, this first factor was labeled, *Significant Efforts to Learn and Understand Academic Material* (SIGEFF). In contrast, the six items in the second factor (F_2) all focus on students' sense of uncertainty about, and dissatisfaction with, the quality

of their exam preparation. Therefore, this second factor was labeled, *Uncertainty About and Dissatisfaction With Exam Preparation* (EXPREP). The correlation between the two factors was .25. Both factors had acceptable levels of internal consistency (α): $F_1 = .90$, $F_2 = .88$.

Figure 3-1

Scree plot of the eigenvalues for the 12 new uncertainty about, and dissatisfaction with, personal performance items.

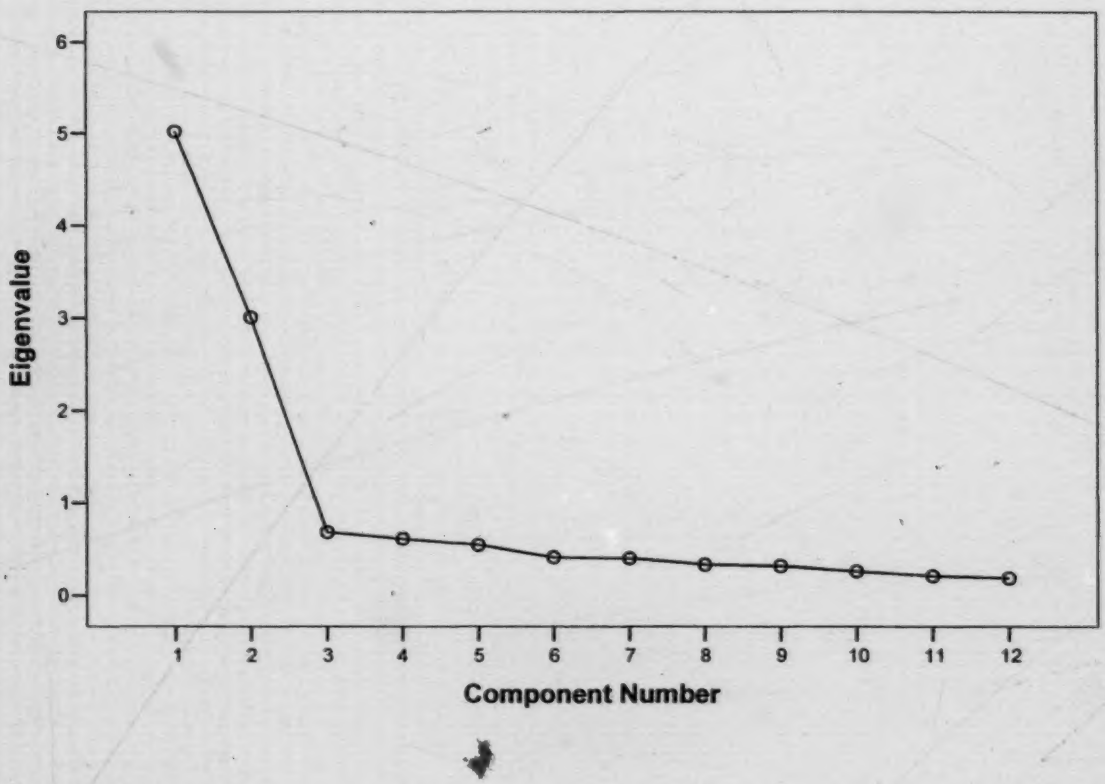

Table 3-2

Pattern Coefficients from Principal Axes Analysis of the Uncertainty and Dissatisfaction Items

Intended domain	Full item descriptions	Pattern Coefficients[a] F1	F2
Dissatisfaction	I usually study for long periods of time because I do not feel that I satisfactorily understand the subject.	.72	-.04
Uncertainty	When I study I usually examine a certain topic over and over again because I am uncertain whether I have learned the material well enough.	.77	.06
Uncertainty	I usually expend extra effort studying a certain topic because I am not sure if I understand the material well enough.	.75	-.10
Dissatisfaction	I usually expend extra effort studying a certain topic because I am convinced that I do not satisfactorily understand the material.	.81	.05
Dissatisfaction	When I study I usually examine a certain topic over and over again because I'm convinced that I haven't learned the subject well enough.	.88	.06
Uncertainty	I usually study for long periods of time because I have doubts about whether or not I know the subject well enough.	.78	.03
Uncertainty	I usually expend extra effort studying a certain topic because I am not sure if I understand the material well enough.	.11	.67
Dissatisfaction	I rarely feel satisfied with my exam study habits.	-.13	.75
Uncertainty	I usually have trouble deciding when I have studied enough for an exam.	.21	.63
Uncertainty	I usually feel unsure about the adequacy of my exam study habits.	.01	.81
Dissatisfaction	I rarely feel fully prepared for an exam.	-.10	.83
Dissatisfaction	I rarely feel that I have done sufficient studying in preparation for an exam.	.02	.80

Note. F1 = Significant efforts to learn and understand academic material; F2 = Uncertainty about and dissatisfaction with exam preparation.

[a] Interfactor correlation ($r_{F1.F2}$) = .25.

Relationships Between SIGEFF, EXPREP, and DAA-Frost

The relationships between each of the two factors (i.e., SIGEFF and EXPREP) and the original DAA-Frost subscale were examined. Table 3-3 contains the mean item scores and standard deviations for the three subscales. Both SIGEFF and EXPREP had significant correlations with DAA-Frost (*r*s = .37 and .58 respectively, both *p*s < .001). To determine whether the magnitude of these correlations differed significantly from each other, a follow-up statistical analysis to test differences between dependent correlations was used (Glass & Hopkins, 1984, p. 311). Results indicated that the correlation between EXPREP and DAA-Frost was significantly greater than the correlation between SIGEFF and DAA-Frost (t [220] = 3.14, $p < .01$).

Table 3-3

Means, Standard Deviations, Internal Consistencies (α), and Correlations (r) Between all Variables

Subscales	DAA	SIGEFF	EXPREP
	M = 2.65, *SD* = 0.69	*M*= 3.24, *SD* = 0.81	*M*= 3.34, *SD* = 0.81
DAA	α = .74		
SIGEFF	.37*	α = .90	
EXPREP	.58*	.26*	α = .88

Note. DAA = Doubts about actions; SIGEFF = Significant efforts to learn and understand academic material; EXPREP = Uncertainty about and dissatisfaction with exam preparation.

* $p \leq .001$.

A stepwise multiple regression analysis was conducted to further examine the relationships between EXPREP, SIGEFF, and DAA-Frost. In this analysis, DAA-Frost was entered as the dependent variable and EXPREP and SIGEFF were entered as independent variables. As indicated in Table 3-4, both EXPREP ($\beta = .513, p < .001$) and SIGEFF ($\beta = .241, p < .001$) significantly predicted DAA-Frost scores. However, examination of the partial correlations associated with each independent variable indicated that EXPREP explained 29.16% of the unique variance in DAA-Frost while SIGEFF only explained 7.84% of the unique variance in DAA-Frost. In combination with the bivariate correlation results, the present results suggest that EXPREP is more closely related to the original DAA-Frost subscale than SIGEFF.

Table 3-4

Stepwise Multiple Regression Analysis of Doubts About Actions Subscale on EXPREP and SIGEFF

Frost-MPS subscale	Step		β	*t*	*p*	Change in R^2	Partial correlation
Doubts About Actions	1	$F(1, 221) = 109.03, p < .001, R^2 = .330$				.330	
		EXPREP	.575	10.44	< .001		.58
	2	$F(2, 220) = 68.78, p < .001, R^2 = .385$				.055	
		EXPREP	.513	9.39	< .001		.54
		SIGEFF	.241	4.41	< .001		.28

Note. EXPREP = Uncertainty about and dissatisfaction with exam preparation; SIGEFF = Significant efforts to learn and understand academic material.

Discussion

This pilot study was conducted to clarify the domain specification of the doubts about actions dimension of perfectionism. More specifically, the purposes of this pilot study were (a) to determine if individuals distinguished between two potential components of doubts about actions (namely, uncertainty about personal performance and dissatisfaction with personal performance) and (b) to examine the relationships between these potentially distinct components and doubts about actions as measured by the original DAA-Frost subscale. It was proposed that examination of these issues would help guide the development of doubts about actions items specific to the domain of sport that could eventually be added to the Sport-MPS.

With regards to the first purpose of this pilot study, the factor-analytic results (see Table 3-2) suggest that students did not distinguish between uncertainty about, and dissatisfaction with, the quality of personal performance in the academic domain. Specifically, the two factors that best represented the latent structure of the 12 items contained equal numbers of items that focused on uncertainty and dissatisfaction respectively. These findings appear to indicate that uncertainty about the quality of personal performance and dissatisfaction with the quality of personal performance are commensurable constructs that can be assessed within a single subscale. Given that both of these components have been identified by perfectionism theorists (e.g., Burns, 1980; Hamachek, 1978) as central to doubts about actions, it follows that the domain specifications that will be utilized to develop doubts about actions items for the Sport-MPS should also represent both aspects of the construct.

To address the second purpose of this pilot study, the correlations between

SIGEFF, EXPREP, and DAA-Frost were examined. Given that the DAA-Frost subscale is representative of both uncertainty about, and dissatisfaction with, the quality of personal performance (Frost et al., 1990), the subscale served as the criterion variable. Both SIGEFF and EXPREP had significant positive correlations with DAA-Frost (r = .37 and .58, respectively), however, further statistical analysis revealed that the correlation between EXPREP and DAA-Frost was significantly larger than the correlation between SIGEFF and DAA-Frost. Additionally, the stepwise multiple regression analysis (see Table 3-4) indicated that EXPREP explained a larger proportion of the unique variance in DAA-Frost scores than SIGEFF. It appears that the item content of the EXPREP factor has more conceptual similarity with doubts about actions than the item content of SIGEFF. These results suggest that the item-content of the EXPREP factor may serve as a useful template in determining domain specifications for doubts about actions in the context of sport.

This contention depends on the degree to which the nomological models of achievement motivation constructs (such as perfectionism) differ between the contexts of academe and sport. Duda and Nicholls (1992) addressed this issue by examining the cross-situational generality of 10th and 11th grade high-school students' (n = 207) achievement goal orientations in sport and academe. The students responded to a set of items designed to assess achievement goal orientations in school and a parallel set of items designed to assess achievement goal orientations specific to sport. Separate exploratory factor analyses were conducted upon the students' responses to each set of items and revealed similar achievement goal orientation factors/constructs in sport and academic settings.

Duda and Nicholls's (1992) results suggest that the nomological structure of achievement motivation constructs may be similar across the domains of academe and sport (although absolute levels of achievement motivation constructs may differ between these settings [see Dunn et al., 2005]). Thus it may be appropriate to operationalize doubts about actions in sport using a definition that was originally developed in an academic setting. However, given researchers' concerns regarding the generality or domain-specificity of achievement motivation constructs across achievement settings (e.g., Duda & Nicholls; Eccles & Harold, 1991; Weiner, 1990), this assumption should be examined in future research.

Examination of the items that comprise EXPREP (see Table 3-2) reveals a focus on students' sense of uncertainty about, and dissatisfaction with, the quality of their study efforts to prepare for exams. This focus has parallel constituents within the sport domain. Specifically, students' study efforts for exams are conceptually analogous to athletes' training efforts for competitions. Thus, for the purposes of developing sport-based doubts about actions items, doubts about actions in sport was operationalized as representing *the degree to which athletes are uncertain about, or dissatisfied with, their training in preparation for competition in their primary sport.*

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Chapter 4

Assessing the Content Relevance and Content Representativeness of Sport-Based Doubts About Actions and Organization Items

The first phase of this dissertation described the process used to develop domain specifications that operationalized the perfectionism dimensions of doubts about actions and organization in sport. The focus of the present phase of the dissertation is to develop items based on these operationalizations and to obtain content-related validity evidence supporting the use of these new items for measurement purposes. Messick (1989) indicated that is extremely important to obtain content-related evidence during the construct validation process because the nature and extensiveness of a test's content sets the boundaries for inferences that can be made from the test's assessments. *The Standards for Educational and Psychological Testing* states that content-related validity evidence "can be obtained from an analysis of the relationship between a test's content and the construct it is intended to measure" (American Psychological Association, 1999, p. 11). Content-related validity evidence is usually produced through analysis of experts' judgments of the degree of content relevance and content representativenss exhibited by an instrument's item content (Messick).

Content relevance refers to the extent to which the "content" of an instrument (i.e., the subject matter of the test items) is relevant to the construct that the instrument is designed to assess (Dunn, Bouffard, & Rogers, 1999). Content representativeness refers to how well an instrument assesses all identifying aspects of a construct (Crocker & Algina, 1986). Such content-related validity evidence should be ideally produced before instruments are used in research or applied settings (Hambleton, 1980; Nunnally &

Berstein, 1994). Therefore, the purpose of the present investigation was to use an expert review process to examine the content relevance and content representativeness of newly constructed doubts about actions (DAA-Sport) and organization (ORG-Sport) items.

Method

The methods used in this phase of the dissertation were based upon an item content relevance assessment procedure described by Hambleton (1984). Hambleton's procedure requires expert judges to evaluate items based on each items' degree of relevance to a specified domain, but can also be applied towards evaluating the degree to which sets of content relevant items are representative of a specified domain. The present study used a two-step process to evaluate expert judges' ratings of the content relevance and content representativeness of six new DAA-Sport items and six new ORG-Sport items. The first step in this process asked judges to assess the content relevance of each of these 12 items. The second step in the process (conducted after the content relevance assessment procedure was completed) required judges to evaluate the degree of content representativeness displayed by each item set. There was a time lag between these two steps to allow the researcher to collect and analyze the judges' item content relevance ratings (given that there was little point in assessing content representativeness if some of the items in the set were deemed irrelevant to the construct).

Development of Sport-Based Organization Items

As indicated in Chapter 2, organization was operationalized as "*athletes' tendencies or desires to establish and implement plans or routines that dictate their behavior prior to and during competition in their primary sport.*" A pool of items based on the operational definition was created by the author. This item pool was then refined

by the author and his supervisor (Dr. John Dunn) in accordance with item construction guidelines advocated by Crocker and Algina (1986). Both item developers had a sound understanding of perfectionism (as evidenced by five peer reviewed publications involving perfectionism in sport), knew the populations to which the items were to be administered (i.e., high school aged to adult athletes), and had taken graduate level courses that focused on the process of item construction (see Rogers, 2001). Six items (see Table 4-1) were written to reflect the organization domain specification.

Table 4-1

Items Proposed to Represent Organization in Sport

Items
1. On the day of competition I have a routine that I try to follow.
2. I have and follow a pre-competitive routine.
3. I follow pre-planned steps to prepare myself for competition.
4. I follow a routine to get myself into a good mindset going into competition.
5. I develop plans that dictate how I want to perform during competition.
6. I set plans that highlight the strategies I want to use when I compete.

Development of Sport-Based Doubts About Actions Items

The current sport-based domain specifications of doubts about actions were based upon the content of items in the EXPREP factor established in Chapter 3. That is, doubts about actions was operationalized as "*athletes' tendencies to be uncertain about, or dissatisfied with, their training in preparation for competition in their primary sport.*" It follows that a similar process could be utilized to develop items that represent doubts

about actions in sport. Using the same parallels between the domains of academe and sport that were used to develop the domain specifications of doubts about actions in academe (i.e., "studying is to exams as practicing is to athletic competition"), the six EXPREP items were adapted to fit the domain of sport (see Table 4-2). Given the proposed conceptual similarity between EXPREP and doubts about actions in the academic domain, it was expected that these new items would be relevant to and representative of doubts about actions in the sport domain.

Assessment of Item Content Relevance

Participants

Three major criteria were established to identify individuals who could potentially act as expert judges in the present content relevance and content representativeness assessment processes. Brown (1983) indicated that expert judges should have knowledge of the type and intended purpose of the test under question. Crocker and Algina (1986) also stated that expert judges should have a good understanding of the constructs that are being investigated. In the present case, the items under question are intended to be included in a revised version of the *Sport Multidimensional Perfectionism Scale* (Sport-MPS: Dunn, Causgrove Dunn, & Syrotuik, 2002) and are proposed to represent dimensions of perfectionism in sport. Consequently, experts in this area were identified as people who had (a) obtained a graduate level degree (e.g., Ph.D. or M.A.), (b) either published or presented research papers in refereed settings on the topic of perfectionism, and (c) employed perfectionism self-report inventories in their research. Fifteen individuals who met these criteria were contacted to determine if they would be willing to participate as expert judges in this item-assessment process. Nine of these 15 individuals

Table 4-2

EXPREP Items and Parallel Sport-Based Versions of these Items

EXPREP items	Sport-modified items
1. I usually feel uncertain about whether or not I have adequately prepared for an exam.	1. I usually feel uncertain as to whether or not my training effectively prepares me for competition.
2. I rarely feel satisfied with my exam study habits.	2. Prior to competition, I rarely feel satisfied with my training.
3. I usually have trouble deciding when I have studied enough for an exam.	3. I usually have trouble deciding when I have practiced enough heading into a competition.
4. I usually feel unsure about the adequacy of my exam study habits.	4. I usually feel unsure about the adequacy of my pre-competition practices.
5. I rarely feel fully prepared for an exam.	5. I rarely feel that my training fully prepares me for competition.
6. I rarely feel that I have done sufficient studying in preparation for an exam.	6. I rarely feel that I have trained enough in preparation for a competition.

Note. EXPREP = Uncertainty about and dissatisfaction with exam preparation.

agreed to participate. This number of judges fits within Lynn's (1986) recommendation that 5-10 judges should be used in content-related validity investigations to control for chance agreement among the judges.

Of the nine participants, seven had earned their doctoral degrees and held full-time academic appointments in sport science, psychology, or psychiatry departments at North American, Australasian, or European universities. The remaining two judges had earned their M.A. in sport psychology and both had focused on perfectionism in their master's theses. Eight of the participants had published perfectionism research in refereed sport psychology or psychology journals. The only judge who had not published research on perfectionism in a refereed journal had presented perfectionism research (as the lead investigator) at refereed sport psychology conferences on at least three separate occasions.

Measures

Demographic questionnaire. The demographic questionnaire asked the judges to indicate their academic degree, institutional affiliation, academic rank, and the number of times they had published and presented perfectionism research.

Content relevance. The instrument used to assess the content relevance of the items (see Appendix B for an abbreviated version of this instrument) first presented the sport-based domain specifications for doubts about actions and organization.

> Doubts About Actions- These are statements that reflect the degree to which athletes are uncertain about, or dissatisfied with, their training in preparation for competition in their primary sport.

Organization- These are statements that reflect athletes' tendencies or desires to establish and implement plans or routines that dictate their behavior prior to and during competition in their primary sport.

Judges were then presented with the 12 items that had been constructed to assess these two constructs. The instructions asked judges to read over and familiarize themselves with the domain specifications and items, and to then rate the degree to which the content of each item fit within the content of the domain it was intended to measure (as defined by the domain specifications). Judges based their ratings on a 5-point scale (1 = *poor fit*; 2 = *fair fit*; 3 = *good fit*; 4 = *very good fit*; 5 = *excellent fit*). After rating each item, judges were given space to provide comments regarding the item's content or structure (e.g., confusing wording or unnecessarily advanced vocabulary) and feedback regarding the item assessment process as a whole. An example of one of the items from the instrument is provided in Figure 4-1 below.

Figure 4-1

An item from the content relevance assessment instrument.

Item 1: I usually feel uncertain as to whether or not my training effectively prepares me for competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Doubts About Actions	☐	☐	☐	☐	☐

Comments:

Procedure

Judges were sent a document via electronic mail that contained a demographic questionnaire and the instrument used to assess content relevance. The instructions in the document asked the judges to respond to both instruments and then return their responses to the principal investigator using either electronic or regular mail. If judges indicated that they were willing to participate in the project, then their response was taken as indication of their informed and voluntary consent.

Results and Discussion

Screening for Discrepant Raters

The first step towards evaluating the judges' item content relevance ratings requires the examination and identification of potentially discrepant raters (see Dunn et al., 1999). Discrepant raters can be defined as judges whose item ratings deviate from the ratings of other judges to such a degree that they may undermine the validity of statistics used to evaluate the items under investigation (Hambleton, 1984). In the present study, the screening of potentially discrepant raters was conducted through the use of a statistic named the *Judge's Discrepancy from the Median Rating* (JDM: Rogers, 2001). This statistic is calculated by the following formula:

$$JDM_j = \sum_{k=1}^{K} \left| X_{kj} - Md_k \right|$$

where

X_{kj} = the rating given by judge j to item k;

Md_k = the median of the ratings given by the J judges to item k;

K = the number of items; and

$|X_{kj} - Md_k|$ = the absolute value between the rating given by judge j to item k and the median of the ratings given for item k.

A JDM was calculated for each judge's set of ratings on the 12 items (see Table 4-3). Rogers (2001) suggests that potentially discrepant judges are initially identified as judges who have aberrantly high JDM scores. That is, judges who have high JDM scores that also differ considerably from the JDM scores of the majority of the judges may be discrepant judges. In this study, the mean JDM score was 10.11 (SD = 5.25) and the median JDM score was 8.00. Examination of Table 4-3 reveals that three judges (i.e., Judges 4, 6, and 7) had JDM scores that were 8 to10 points higher than the highest JDM scores of the remaining six judges. However, all judges were within 1.52 standard deviations of the mean JDM, suggesting that no single judge was considered overly extreme in her/his ratings.

Table 4-3

Judge's Discrepancy from the Median Statistic (JDM) for Each Judge

Judge #	1	2	3	4	5	6	7	8	9	*M*	*SD*	*Mdn*
JDM	8.0	8.0	6.0	17.0	6.0	16.0	18.0	6.0	6.0	10.11	5.25	8.00

To further assist with the identification of potentially discrepant raters, Rogers (2001) also recommended that JDM scores be re-calculated with the ratings of suspected discrepant judges removed. Evidence to support the labeling of the supposed judges as "discrepant judges" is produced if these new JDM scores are still considerably different from the original JDM scores of the supposed discrepant judges. To examine the

possibility that Judges 4, 6, and 7 were discrepant raters, new JDM scores for each judge were calculated with the ratings for Judges 4, 6, and 7 removed from the analyses (see Table 4-4). These analyses revealed that the original JDM scores for Judges 4, 6, and 7 were 7.5 to 9.5 points higher than the highest recalculated JDM scores of the remaining 6 judges. This evidence indicates that Judges 4, 6, and 7 demonstrated some differences from the majority of the other judges.

Table 4-4

Judge's Discrepancy from the Median Statistic (JDM) for Each Judge with Judges 4, 6, and 7's Ratings Removed

Judge #	1	2	3	4	5	6	7	8	9	*M*	*SD*	*Mdn*
	3.5	5.5	2.5	**R**	7.5	**R**	**R**	8.5	6.5	5.67	2.32	6.00

Note. **R** = Judge's ratings removed from analysis.

Typically, discrepant judges' ratings are removed from the dataset because their extreme scores have the potential to adversely affect descriptive statistics that are examined in subsequent analyses (Hambleton, 1984). To investigate whether this occurred in the present study, all of the item content relevance analyses were calculated twice: once with the ratings of all nine judges included in the dataset and once with the ratings of Judges 4, 6, and 7 removed from the dataset. Results suggested that the presence of Judges 4, 6, and 7 did not appear to substantially affect the results (see Appendix C for a detailed description of these comparative results). Moreover, removal of these three judges would equate to the removal of one-third of the entire sample. Given

the implications that such an action may have on the sample characteristics, the results presented below are based upon the ratings provided by all nine judges.

Quantitative Assessment of Content Relevance Ratings

The mean, standard deviation, and median judges' content relevance ratings for each item are displayed in Table 4-5 (the complete judge-by-item content relevance rating matrix is presented in Appendix D). Examination of these descriptive statistics reveals that the mean content relevance rating for each item was ≥ 3.56. The median content relevance rating for 10 of the 12 items was ≥ 4.00 and the median content relevance rating for each of the two remaining items was 3.00. Given the 5-point scale that the judges employed (i.e., 1 = *poor fit*; 2 = *fair fit*; 3 = *good fit*; 4 = *very good fit*; 5 = *excellent fit*), these mean and median scores indicate, on average, that each item was judged to possess at least a good fit with its intended domain.

Table 4-5 also displays the range (R_k) of the judges' ratings for each of the proposed items. This statistic is calculated by the following formula:

$$R_k = X_{kjH} - X_{kjL} + 1,$$

where X_{kjH} and X_{kjL} represent the highest and lowest content relevance rating for an item across all judges' ratings. A high value of R_k (e.g., R_k values of 4.00 or 5.00) represents a high degree of variance among the judges' ratings for a particular item. In contrast, low values of R_k (e.g., R_k values of 1.00, 2.00, or 3.00) represent that the judges' ratings for an item were all relatively similar. As seen in Table 4-5, two of the proposed DAA-Sport items and three of the proposed ORG-Sport items were associated with R_k values of 4.00 indicating that there was a high degree of variance in the ratings provided by at least two judges for these five items. Therefore, although the mean and median content relevance

Table 4-5

Item Content Relevance Rating Descriptive Statistics for All Nine Expert Judges

Item	Intended Domain	*M*	*SD*	*Mdn*	*Range*	Aiken's *V*
1. I usually feel uncertain as to whether or not my training effectively prepares me for competition.	DAA	3.89	1.05	4.00	4.00	.72*
2. I usually feel unsure about the adequacy of my pre-competition practices.	DAA	4.00	.87	4.00	3.00	.75*
3. I usually have trouble deciding when I have practiced enough heading into a competition.	DAA	3.89	1.17	4.00	4.00	.72*
4. Prior to competition, I rarely feel satisfied with my training.	DAA	3.56	.88	3.00	3.00	.64
5. I rarely feel that my training fully prepares me for competition.	DAA	4.22	.97	5.00	3.00	.80**
6. I rarely feel that I have trained enough in preparation for a competition.	DAA	4.11	1.05	5.00	3.00	.78*
7. On the day of competition I have a routine that I try to follow.	ORG	4.33	.87	5.00	3.00	.83**
8. I have and follow a pre-competitive routine.	ORG	4.22	.97	5.00	3.00	.80**
9. I follow pre-planned steps to prepare myself for competition.	ORG	4.22	.97	5.00	3.00	.80**
10. I follow a routine to get myself into a good mindset going into competition.	ORG	4.11	1.17	5.00	4.00	.78*
11. I develop plans that dictate how I want to perform during competition.	ORG	3.56	1.24	3.00	4.00	.64
12. I set plans that highlight the strategies I want to use when I compete.	ORG	3.78	1.09	4.00	4.00	.69

Note. DAA = Doubts about actions. ORG = Organization.

* $p < .05$; ** $p < .01$.

ratings for each item indicate sufficient degrees of content relevance, the range statistics reveal that this was not a unanimous sentiment among the judges.

Dunn et al. (1999) suggested that statistical tests can be used in concert with descriptive statistics to enhance the rigor of the item content relevance assessment process. Therefore, Aiken's (1985) content validity coefficient (V) was used to statistically examine the judges' content relevance ratings. Aiken's V is a statistic that allows researchers to test whether judges' ratings for an item on its proposed domain are significantly higher than ratings that could occur by chance. To determine a value for V, each item is assessed by n judges on a scale of c successive integers. In the present study each item was assessed by nine judges on a scale of 5 successive integers (i.e., the 5-point scale). The lowest integer in this scale (i.e., "1") was designated as lo and each judge's ratings were designated as r. These r values are then transformed by the calculation: $s = r - lo$. For each item, the s scores associated with that item were then summed to produce S. The V coefficient summarizing the item-content relevance ratings for each item is then calculated by $V = S/[n(c - 1)]$. This coefficient can range from 0 to 1, with a value of 1.0 indicating that all n judges gave an item the highest possible rating (i.e., an excellent fit within the item's intended domain) and a value of 0 indicating that all n judges gave an item the lowest possible rating (i.e., a poor fit with the item's intended domain). The statistical significance of the V coefficient associated with each item is determined by comparing each item's V against a right-tailed binomial probability table provided by Aiken (p. 134).

Table 4-5 contains the V coefficients that were calculated from the nine judges' ratings for the 12 items. As the table indicates, the judges' ratings for five of the proposed

DAA-Sport items and four of the proposed ORG-Sport items produced *V* coefficients that were statistically significant. When viewed in conjunction with these items' mean and median ratings, these *V* coefficients support the content relevance of the items. However, the *V* coefficients produced from the expert judges' ratings for one of the proposed DAA-Sport items (i.e., "Prior to competition, I rarely feel satisfied with my training") and two of the proposed ORG-Sport items (i.e., "I develop plans that dictate how I want to perform during competition" and "I set plans that highlight the strategies I want to use when I compete") were not statistically significant.[1] Therefore, while the descriptive statistics associated with these items are indicative of adequate levels of content relevance, the fact that these three items were not rated highly enough to produce significant *V* coefficients must be acknowledged. In general, though, the combination of these descriptive (i.e., mean, median, and range) and inferential (i.e., Aiken's *V*) statistics suggest that all of the items in both DAA-Sport and ORG-Sport subscales were relevant to their respective domains (all be it to varying degrees).

Qualitative Assessment of Content Relevance Ratings

Dunn et al. (1999) suggested that judges' written feedback can be useful when interpreting the quantitative results obtained from the item content relevance assessment process. Therefore, the qualitative feedback provided by the judges in the present study was examined. For reporting purposes, the judges are identified by their Judge Number (as indicated in Table 4-3) so that each judge can be associated with her or his specific comments.

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[1] It is worth noting that when judges 4, 6, and 7 were removed, the only item that was associated with a non-significant *V* was the doubts about actions item that read "Prior to competition, I rarely feel satisfied with my training".

In reference to the presented domain specification for doubts about actions, Judge 3 indicated that instead of focusing on athletes' perceptions of their training in general, the dimension should distinguish between athletes' dissatisfaction with and uncertainty about (a) their effort in practice, and (b) their training program or coaching. This judge proposed that such a distinction would be beneficial because dissatisfaction or uncertainty with one's effort in training would be indicative of perfectionistic tendencies in sport, while dissatisfaction or uncertainty towards one's training program or coaching would not be relevant to perfectionism in sport.

Judges 4 and 7 questioned whether the conceptualizations of doubts about actions and organization were even relevant to the construct of perfectionism. These two judges indicated their dissatisfaction with Frost, Marten, Lahart, and Rosenblate's (1990) conceptualization of perfectionism (as assessed by the Frost-MPS) thereby questioning the need to develop DAA-Sport or ORG-Sport items in the first place. For example, Judge 7 said that Frost et al.'s conceptualization of perfectionism did not "truly reflect the operational definition of perfectionism." Similarly, Judge 4 stated that he/she was "not very happy with the [Frost-MPS] as a measure of the perfectionism construct and its facets" and specifically questioned the relevance of Frost et al.'s conceptualization of doubts about actions to perfectionism. This might explain why Judges 4 and 7 were flagged as potentially discrepant raters given that they may have based their item content relevance ratings on their opinions of Frost et al.'s conceptualizations of doubts about actions and organization (as opposed to basing their ratings on the domain specifications that were presented in this study). Indeed, Judge 4 commented that her/his "[content relevance] ratings reflect mostly [her/his] discontent with the [Frost-MPS] items and

[Frost et al.'s] conceptualization, [but] not with [the present researcher's] efforts". Along these same lines, Judge 2 stated "although the proposed items matched the domains very well..., I personally am not convinced that the doubts about actions and organization dimensions add anything to the sport perfectionism domain."

The qualitative feedback provided by the judges was also examined to see if the judges had any concerns about the structure of the items (e.g., confusing wording, inappropriate language level, or multiple implied meanings). This examination revealed that the judges did not have any systematic or consistent concerns regarding the structure of the items, although several judges did advise minor wording adaptations to several specific items. For example, Judge 5 suggested that "practices" be changed to "preparation" in the DAA-Sport item that read "I usually feel unsure about the adequacy of my pre-competition practices". Similarly, Judge 2 indicated that "game/competition" should replace "competition" in the DAA-Sport item that read "I usually feel unsure about the adequacy of my pre-competition practices." However, none of this feedback implied that any individual item needed significant adaptation to correct for major weaknesses in structure. The judges' lack of systematic consistent concern regarding the structure of any one item was taken as evidence that each of the proposed items displayed adequate levels of face validity. Therefore, none of the items were edited in relation to the judges' concerns regarding wording or sentence structure.

Assessment of Item-Set Content Representativeness

Participants

Once the nine expert judges who participated in the item content relevance stage of this study had returned their responses and their ratings had been analyzed (a process

that took approximately 1.5 months), these same participants were again contacted to initiate the second and final stage of the study (i.e., the assessment of item-set content representativeness). Eight of the nine judges from the first stage of this study participated in this second stage. Judge 6 was the only judge who elected not to participate in the second phase of this investigation (as evidenced by her/his failure to complete and return the instrument associated with this stage).

Measures

Content representativeness. The instrument used to assess the content representativeness of the items (see Appendix E) presented the domain specifications for doubts about actions and organization together with the 12 items designed to measure these constructs. To demonstrate to respondents that each of these items had been deemed relevant to its intended domain, the instrument also presented the content relevance results from the first stage of this process (i.e., the descriptive statistics and Aiken's *V* coefficients from Table 4-5). Judges were asked to familiarize themselves with the domain specifications, the proposed items, and the statistics/coefficients associated with each item-set. Respondents were then instructed to rate the degree to which each set of items adequately covered the intended domain. The judges based their ratings on a 5-point scale (1 = *poor representation*; 2 = *fair representation*; 3 = *good representation*; 4 = *very good representation*; 5 = *excellent representation*). Judges were then asked (a) whether any additional items should be added to each item-set to measure some aspect of the intended domain that the respective item-set did not adequately cover, and (b) to suggest such items if they were deemed necessary. Finally, the instrument asked respondents to provide any comments that they may have had in regards to the stated

domain specifications of doubts about actions or organization constructs and the degree to which these dimensions were relevant to the trait of perfectionism.

Procedure

The eight judges were sent a document via electronic mail that contained the instrument used to assess content representativeness. The instructions in the document asked the judges to respond to the instrument and then return their responses to the primary researcher using either electronic or regular mail.

Results and Discussion

Screening for Discrepant Raters

It was deemed necessary to again screen for potential discrepant raters given that the judges in this phase of the study produced a set of ratings that were distinct from their ratings in the item content relevance phase of the study. During the first stage of the study screening for potentially discrepant raters used Rogers's (2001) *JDM* statistic. However, use of this statistic in the present screening was deemed unnecessary due to the small number of ratings made by each judge (i.e., each of the eight judges only made two ratings). Instead, the judges' content representativeness ratings were visually inspected for ratings that were substantially different from the set of ratings as a whole. Given that all of the judges' ratings for both the DAA-Sport and ORG-Sport item-sets ranged from 3.00 (good representation) to 5.00 (excellent representation), no such deviant ratings were identified. Therefore, none of the judges were deemed to be discrepant raters and all of their ratings were included in the subsequent analyses.

Quantitative Assessment of Content Representativeness Ratings

Table 4-6 displays the judges' ratings for the DAA-Sport and ORG-Sport item sets along with the descriptive statistics associated with each set of ratings. The mean content representativeness rating for the DAA-Sport and ORG-Sport item-sets was 4.00 (SD = .76) and 3.75 (SD = .71) respectively. The median content representativeness rating for both item-sets was 4.00. Given that ratings of 3.00 and 4.00 indicated that the item-set in question had "good" or "very good" coverage of their intended domains respectively, these mean and median scores provided initial evidence that the judges felt that both item-sets adequately covered the two domains. Finally, the R_k statistic (i.e., $R_k = X_{kjH} - X_{kjL} + 1$) associated with the content representativeness ratings for each data set was 3.00 indicating that there were relatively low levels of variance among the judges' ratings for each data set.

Table 4-6

Item-Set Content Representativeness Ratings and Descriptive Statistics

Judge #	1	2	3	4	5	7	8	9	*Mean*	*SD*	*Mdn*	*Range*	Aiken's *V*
DAA	5	4	3	3	5	4	4	4	4.00	.76	4.00	3.00	.75*
ORG	4	4	3	3	5	3	4	4	3.75	.71	4.00	3.00	.69

Note. DAA = Doubts about actions; ORG = Organization.

* $p < .05$.

As in the analyses of the judges' item content relevance ratings, Aiken's (1985) V coefficient was used to statistically analyze the content representativeness ratings. There

is an important difference between the use of Aiken's *V* coefficient in the current item-set content representativeness analyses and the previous item content relevance analyses. Specifically, in the current analysis *r* represents the judges' ratings of the representativeness of a *set of items* towards a specific domain whereas *r* represented the judges' relevance ratings *for each item* in regards to its intended domain in the content relevance analysis. Therefore, in the current analyses, a *V* value of 1.0 would indicate that the all judges rated the item-set as having "excellent representativeness" of its intended domain and a value of 0 would indicate that all the judges rated the item-set as having "poor representativeness" of its intended domain. Otherwise the procedures to calculate and determine the significance of *V* were the same as those described earlier.

As seen in Table 4-6, the *V* coefficient associated with the DAA-Sport item-set was .75 ($p < .05$). Viewing this *V* coefficient in conjunction with this item-set's mean and median content representativeness ratings indicates that the judges viewed the set of DAA-Sport items as adequately covering the doubts about actions domain. In contrast, the *V* coefficient for the ORG-Sport items ($V = .69$) approached, but did not attain, statistical significance.[2] Although this coefficient does not provide statistical support for the content representativeness of the ORG-Sport items, it should be reiterated that the mean and median content representativeness ratings for this set of items (i.e., 3.75 and 4.00 respectively) indicated that the item set was judged to provide "good" or "very good" coverage of the organization domain.

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[2] Aiken's (1985) right-tailed binomial probability table indicates specific *V* coefficients that correspond to *p* values *close* to .05. For the specific number of judges and rating categories in the content representativeness analysis, Aiken's table indicates that a *V*-value of .75 corresponds to a *p* value of .030. Therefore, it is safe to assume that the *V* coefficient for ORG-Sport ($V = .69$) approached a statistical significance value of $p < .05$.

Qualitative Assessment of Content Representativeness Ratings

After rating the degree to which each set of items represented its specified domain, the judges were asked to indicate whether they felt that any additional items should be added to the respective item-sets to measure some aspect of the intended domains that were not addressed. One judge answered "yes" to this question in regards to both the proposed DAA-Sport and ORG-Sport item-sets and two judges answered "yes" to this question in regards to only the proposed DAA-Sport item-set. However, only one of the three judges provided additional feedback. This judge indicated that while the domain specifications of organization reflected athletes' *tendencies* or *desires* to make and follow plans to organize their pre- and during-competition behavior, the items proposed to represent this domain only addressed athletes' *tendencies* (but not their *desires*) to have and follow such plans or routines.

Several judges indicated that the item sets should represent content areas that were not specified in the domain specifications of doubts about actions and organization. For example, judges proposed that the DAA-Sport item-set should also contain items that reflected (a) enhanced levels of self-doubt, (b) self-doubt in reference to one's ability to perform specific skill-sets adequately during athletic competition, (c) uncertainty about the structure and intensity of practice without reference to upcoming competitions (e.g., training for the sake of training itself), or (d) enhanced levels of worry (respectively). Two judges also indicated that the proposed set of ORG-Sport items should contain additional items that reflect (a) routines that athletes may use before training and after competition or (b) preparatory plans that athletes may use to guide their training in the weeks or years prior to competitions (respectively). Lastly, one judge indicated that the

proposed ORG-Sport item-set may *over-represent* the intended domain specifications. That is, not only did this judge feel that the ORG-Sport item-set address all the components of the organization domain specification, but that several of the proposed items represented very similar areas of the domain.

General Discussion

The purpose of the present study was to assess the content relevance and content representativeness of 12 items that had been developed to assess the perfectionism dimensions of doubts about actions (six items) and organization (six items) in sport. Taken collectively, the quantitative results indicate that each proposed item and the two proposed item sets were judged by a panel of perfectionism experts to display adequate levels of content relevance and content representativeness (cf. Messick, 1989). For example, the quantitative item content relevance results showed that every item had a mean and median rating that indicated at least a "good fit" with its intended domain (see Table 5-4). Moreover, nine of the twelve items were given content relevance ratings that were higher than would have been expected by chance (as evidenced by statistically significant *V* coefficients: Aiken, 1985). Similarly, the mean and median item-set content representativeness ratings indicated that both sets of items provided "good" or "very good" coverage of their intended domains. Additionally, the content representativeness ratings that corresponded to the DAA-Sport item-set were associated with a statistically significant *V* coefficient (Aiken, 1985), and the *V* coefficient associated with the ORG-Sport representativeness ratings approached (but did not attain) statistical significance.

The qualitative feedback provided by the judges in both the content relevance and content representativeness assessments revealed that these quantitative results were

tempered by concerns regarding the domain specifications that had been developed to operationalize doubts about actions and organization. For example, commenting during the content relevance assessment phase, Judge 3 indicated that it may be beneficial to adapt doubts about actions so that the dimension differentiated between components of athletes' training. This judge felt that athletes' doubts in regards to the amount of effort they expend during training was more representative of doubts about actions in sports than athletes' doubts regarding other aspects of their training (e.g., their actual training program or their coach).

A review of perfectionism theorists' work (e.g., Burns, 1980; Hamachek, 1978) does not indicate whether perfectionists' focus their self-doubt on particular aspects of their performance. For instance, Burns and Hamachek emphasized that even when perfectionists have committed huge amounts of effort toward the completion of tasks, they are often plagued by general nagging feelings of doubt about the quality of their performance. As a result, and because this dissertation represents an initial attempt to develop DAA-Sport items for inclusion in a revised version of the Sport-MPS, the present domain specifications of doubts about actions were not changed in accordance with the recommendations of Judge 3. However, this judge's comments do pose an interesting question regarding the nature of doubts about actions within the domain of sport that future research may wish to examine.

The qualitative feedback provided by Judge 1 regarding the content representativeness of the item-sets revealed that the domain specification for organization may need some minor revision. Judge 1 indicated that, while the organization domain specification focused on athletes' *tendencies* or *desires* to make plans prior to and during

competition, the ORG-Sport items only addressed athletes' *tendencies* to have such plans. Examination of perfectionism theorists' descriptions of perfectionism (e.g., Hamachek, 1978; Hollender, 1965; Missildine, 1963) reveals that perfectionists actively engage in organizational behaviors. Therefore, it was deemed appropriate that the domain specifications used in the present study to define organization should focus on these behavioral tendencies. Nevertheless, as a result of this judge's comments, the portion of the organization domain specification that referred to athletes' "desires" was deleted. The revised domain specification now reads, "*These are statements that reflect athletes' tendencies to establish and implement plans or routines that dictate their behavior prior to and during competition in their primary sport.*"

During the content representativeness assessment, several judges also indicated that the domain specifications associated with each item set should be expanded to include additional content areas. As indicated earlier, examples of the suggested content areas to add to doubts about actions included self-doubt in one's ability to perform during competition and uncertainty about the quality of practices without reference to competitions. Examples of suggested content areas to add to organization included the use of pre-practice and post-competition routines. In general, these recommendations went beyond the characteristics described by perfectionism theorists (Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963) that were utilized to develop the present domain specifications. Therefore, the judges' recommended additions to the doubts about actions and organization domain specifications were not followed.

In hind sight, it is possible that some of the judges made these suggestions because they were not privy to the process utilized to develop the present domain

specifications (see Phase 1 of this dissertation). Providing such background information to the judges might have shown them the logic that was followed to develop the domain specifications in the first place. This information may have alleviated their concerns regarding the domain content of these perfectionism dimensions. Future studies utilizing expert judges to assess content-related validity issues may wish to provide the judges with a summary of the processes used to develop the domain specifications prior to having the judges rate the items.

Qualitative feedback also suggested that some of the judges' ratings may have been affected by pre-conceived views of the constructs in question. Specifically, feedback provided by Judges 2, 4, and 7 during the item content relevance phase revealed that these judges did not feel that Frost et al.'s (1990) conceptualization of perfectionism (and in particular Frost et al.'s conceptualization of the doubts about actions and organization dimensions) provided an adequate conceptualization of perfectionism. These judges' sentiments reflect one side of an on-going debate within the perfectionism literature. That is, several groups of perfectionism theorists (e.g., Rhéaume, Freeston, Dugas, Letarte, & Ladouceur, 1995; Shafram, Cooper, & Fairburn, 2002; Shafran & Mansell, 2001) have questioned the degree to which doubts about actions and organization are actually relevant to perfectionism. Most of this criticism is focused on the view that Frost et al.'s doubts about actions and organization dimensions represent correlates, as opposed to core components, of perfectionism. In contrast, and as indicated in this dissertation, other theorists (e.g., Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963) have stated that characteristics represented by the doubts about actions and organization dimensions are core aspects of perfectionism.

Haynes, Richard, and Kubany (1995) noted that it is often difficult to conduct content validation investigations of constructs that do not have set and generally agreed upon definitions. Perfectionism may be one such construct as evidenced by the generally accepted view that "many different conceptualizations and definitions" of perfectionism exist (Flett & Hewitt, 2002, p. 5). Crocker and Algina (1986) suggested that potential expert judges should be people who have high levels of knowledge surrounding the construct of interest. However, this is clearly problematic when ratings may be provided by experts who have their own distinct views of the fundamental definition of the construct in the first place. Therefore, in the process of identifying potential expert judges, future studies should not only consider a potential judge's degree of expertise, but also whether or not the judge is in favor of the underlying conceptualization that will be utilized in the study.

In reference to the overall purpose of this phase of the dissertation, it should be noted that the judges' qualitative feedback presented very little concern regarding the degree to which the proposed items and item sets were relevant to and representative of their intended domains. Thus, the quantitative and qualitative results obtained in this phase of the scale construction process provide initial construct validity evidence supporting the inclusion of the six DAA-Sport items and the six ORG-Sport items into a revised version of the Sport-MPS (Dunn et al., 2002). However, it is important to note that "content judgments alone do not provide a sufficient evidential basis for the validity of inferences and actions based on test scores" (Messick, 1989, p. 42). Indeed, according to Messick's unified validity framework, content judgments represent just one type of evidence among many that could be amassed to provide evidence of the validity of test

score inferences. Therefore, additional research is required to more fully investigate the degree to which the assessments produced by these new items may provide meaningful and useful information about athletes' perfectionistic orientations in sport and justify their inclusion in a revised version of the Sport-MPS.

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Chapter 5

Structural Validity Evidence Surrounding Sport-Based Doubts About Actions and Organization Items

Messick (1989) indicated that the basic sources of construct validity evidence can be grouped into approximately half a dozen different categories. One of these categories is represented by the structural component of validity (Loevinger, 1957). The structural component of validity pertains to the degree to which the inter-item structure of a measure is "consistent with what is known about the structural relations inherent in behavioral manifestations of the construct in question" (Messick, p. 43). That is, structural-related validity evidence indicates the degree to which the latent dimensionality of a set of items reflects the dimensionality of the construct that the set of items is designed to assess. The present phase of the dissertation is focused on establishing initial structurally-related validity evidence for the newly developed doubts about actions and organization items to determine whether these item-sets are suitable for inclusion in a revised version of the *Sport Multidimensional Perfectionism Scale* (Sport-MPS: Dunn, Causgrove Dunn, & Syrotuik, 2002).

Factor analysis, cluster analysis, and multidimensional scaling represent statistical tools that can be used to examine the latent dimensionality of a set of items (Hair, Anderson, Tatham, & Black, 1998). The three techniques are similar in that they all identify underlying structure through estimates of inter-variable similarity (Davison, 1983). However, multidimensional scaling often provides a simpler and more interpretable solution than factor analysis and cluster analysis when small numbers of dimensions are expected (Davison; Schiffman, Reynolds, & Young, 1981). In the present

study multidimensional scaling (MDS) was chosen as the statistical-tool-of-choice given that this investigation represents an initial examination of the latent dimensionality of the doubts about actions and organization items and only a small number of dimensions are expected to underlie these items.

A general review of MDS was deemed necessary given that the technique has not been utilized extensively in the sport psychology literature. The objective of MDS is to "construct a cognitive map that represents the dimensional space in which individuals perceive perceptual stimuli in the environment" (Patrick & Dzewaltowski, 2000, p. 345). Essentially, MDS transforms judgments of similarity between all possible pairs of a set of objects (or variable/items) into Euclidean distances (Hair et al., 1998). These distances are then represented within a geometric configuration in *n*-dimensional space that best represents the latent psychological structure of similarity data (Kruskal & Wish, 1978). Data points (which represent the initial set of objects/variables) that are in close proximity within this *n*-dimensional space are assumed to be representative of similar psychological constructs. In contrast, data points that are farther apart in the *n*-dimensional space are assumed to represent different psychological constructs. As long as participants are not provided with information regarding the intended structure of items, a beneficial feature of MDS is that resulting solutions can be assumed to be relatively free from experimenter bias and contamination (Dunn, 1999; Hair et al., Schiffman et al., 1981).

The psychological constructs underlying input similarity data are often identified in MDS by interpreting both the dimensions and data-point clusters that are presented in the geometric solutions. However, interpretation of the dimensionality of MDS solutions

is neither required nor necessary (Collins, 1987). In fact, when the goal of an MDS analysis is data reduction (as is the case in the present analyses) the dimensional scaling serves only as a device to graphically display the data point clusters and it is upon these clusters that interpretation of the MDS solution rests (Davison, 1983). Therefore, interpretation of the MDS analyses in this study focuses only on the data-point clusters produced in each analysis.

In typical MDS protocols each participant rates the degree of similarity between all the objects within a specific object-set (Hair et al., 1998). In this study, the "objects" are the perfectionism items of interest. Complete data matrices can be provided by each individual within a sample, and by the sample as a whole (i.e., an aggregrate matrix). As a result, MDS can produce nomothetic (i.e., group level) or idiographic (i.e., individual) solutions (see Dunn, 1994). That is, MDS can produce solutions representing an aggregation of a sample's ratings of similarity between a set of objects as well as solutions representing each individual's perceptual space. Correlations between these two types of solutions provide an estimate of the degree to which the group-level solution is representative of the attributes used by each of the sample members to establish their similarity ratings (Fisher, 1979).

As indicated earlier, the latent structure of the newly constructed doubts about actions and organization items has not been examined. Additionally, it is unknown how these new items relate to the items that comprise the four subscales of the original Sport-MPS (i.e., *Personal Standards* [PS-Sport], *Concern Over Mistakes* [COM-Sport], *Perceived Parental Pressure* [PPP-Sport], and *Perceived Coach Pressure* [PCP-Sport]). It is important to establish this type of information given that this dissertation proposes to

add these new items to the Sport-MPS to represent unique subscales within a revised version of the instrument. Therefore, the purpose of the present phase of the scale construction process was to utilize MDS to (a) examine the latent dimensionality of the newly developed doubts about actions and organization items, and (b) establish initial evidence of how these items may relate to the established subscales of the Sport-MPS.

Method

Participants

A total of 15 female (*M age* = 26.86, *SD* = 3.71) and 18 male high performance Ultimate Frisbee players (*M age* = 26.88, *SD* = 3.57) participated in the study. In the sport of Ultimate Frisbee, two teams of seven players compete on a field similar to a football field to pass a disc between the members of their team with the goal of catching the disc in their opponent's end zone. The Ultimate Players' Association governs Ultimate Frisbee in North America and indicates that the sport combines the non-stop movement and athletic endurance of ice hockey and soccer with the aerial passing and reception skills of football.[1]

The athletes who participated in this study were members of teams that had competed at the 2004 Canadian club national championships. Teams qualify for this tournament by achieving top placements in preceding provincial championships. The national championships culminate the Canadian Ultimate Frisbee summer season, draws teams from all over the country, and represents the highest level of Ultimate Frisbee in Canada. On average, the athletes in this study had played Ultimate Frisbee for 5.41 years (*SD* = 3.29) and had competed in 3.70 Canadian club national championships (*SD* =

[1] Readers are referred to the Ultimate Players' Association's website (http://www2.upa.org/) for more information on the sport.

2.47) and 2.27 Canadian university national championships (SD = 2.14). Eight participants had competed in ultimate tournaments at the international level. Finally, all but two of the participants reported their highest level of participation in at least one other sport (i.e., soccer, downhill ski racing, volleyball, football, swimming, basketball, sailing, track and field, ice hockey, and field hockey) at the high school varsity (n = 8), provincial (n = 12), intercollegiate (n = 4), national (n = 5), or international level (n = 2).

Measures

All participants completed a demographic questionnaire and a Similarity Rating Scale. The demographic questionnaire asked the athletes to indicate their gender, age, past experience in Ultimate Frisbee, and past experiences in other competitive sports.

Similarity Rating Scale. It was not considered feasible nor reasonable to include all 30 Sport-MPS items and the 12 new doubts about actions (DAA-Sport) and organization (ORG-Sport) items into a single Similarity Rating Scale (SRS). This would have required participants to complete a total of 861 paired comparisons. Therefore, three different versions of the SRS were employed to assess the degree of conceptual similarity between marker items from the four subscales of the original Sport-MPS (i.e., PS-Sport, COM-Sport, PPP-Sport, and PCP-Sport) and the newly developed DAA-Sport and ORG-Sport subscales.[2]

Each SRS presented item-pairs in the form of a category-rating technique (Davison, 1983) in which all possible item-pairs were presented. The first version of the SRS (i.e., SRS1) contained the 66 possible item-pairings among the six DAA-Sport items and the six ORG-Sport items. The second SRS version (i.e., SRS2) contained all possible item-pairings (n = 153) among 12 original Sport-MPS subscale marker items (i.e., 3 items

[2] An abbreviated version of one SRS is presented in Appendix F.

each for PS-Sport, COM-Sport, PPP-Sport, and PCP-Sport) and three items from each of the DAA-Sport and ORG-Sport item-sets. The third SRS (i.e., SRS3) contained all possible item-pairings (n = 153) among the same 12 marker items used in SRS2 and the six DAA-Sport and ORG-Sport items that were not utilized in SRS2.[3] Ross-ordering (Ross, 1934) of the items was employed throughout each SRS to reduce the possibility of item presentation order effects.

Following a protocol established by Marsh (1994), the marker items for the original Sport-MPS subscales (i.e., personal standards [PS-Sport], concern over mistakes [COM-Sport], perceived parental pressure [PPP-Sport], and perceived coach pressure [PCP-Sport]) were determined through examination of four separate factor analytic solutions pertaining to Sport-MPS data presented by Dunn and his colleagues (i.e., Dunn et al., 2002; Dunn et al., 2006). The three marker items for each original Sport-MPS subscale were chosen based upon the size of their loadings on their intended factors in the aforementioned studies and upon the extent to which they consistently demonstrated simple structure (Thurstone, 1947). Table 5-1 contains the 12 selected marker items and their pattern coefficients across the solutions presented by Dunn and his colleagues.

Each SRS version instructed respondents to initially read through a list of items contained in the instrument and then to "rate the similarity of the 'underlying concept' in each [item-]pair" (Davison, 1983). Ratings were made on a 9-point scale ranging from 0 (*not at all similar*) to 8 (*very similar*). The athletes were not given any information about the theorized dimensionality of the item-set contained in each SRS (cf. Dunn, 1999) to help ensure that the athletes' responses would not be biased by the researcher's preconceived notions of dimensionality.

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[3] See Tables 5-4, 5-5, and 5-6 for verbatim item descriptors of the items contained in each SRS version.

Table 5-1

Pattern Coefficients for Original Sport-MPS Marker Items From Published Exploratory Factor Analytic Solutions Pertaining to Sport-MPS Data

	Sample															
	Canadian Football[a]				Canadian Football[b]				Ice Hockey[c]				Intercollegiate[d]			
Item	PS	COM	PPP	PCP	PS	COM	PPP	PCP	PS	COM	PPP	PCP	PS	COM	PPP	PCP
16.	**.61**	.00	.09	-.06	**.61**	.03	-.04	.11	**.64**	.07	.15	.10	**.66**	.03	.07	.01
28.	**.75**	-.08	-.04	-.02	**.64**	.03	.01	-.06	**.70**	.00	.04	-.01	**.68**	-.02	-.06	.02
30.	**.68**	.11	-.04	-.07	**.68**	.05	.05	.00	**.66**	.02	.09	-.02	**.65**	-.05	.02	.03
7.	-.01	**.65**	.19	.00	.28	**.49**	.13	.07	.08	**.52**	.06	.08	.05	**.65**	.24	-.15
27.	.18	**.44**	.16	.11	-.01	**.68**	.05	.06	.02	**.50**	.18	.14	.12	**.60**	.01	.23
32.	.02	**.63**	.13	.07	-.12	**.64**	.08	.17	-.06	**.55**	.17	.10	-.08	**.67**	.11	.15
5.	.05	.13	**.64**	-.06	-.09	.10	**.61**	.05	-.06	.03	**.66**	-.02	-.16	.14	**.69**	.08
15.	.00	.04	**.81**	-.04	-.10	.03	**.77**	-.02	.14	.15	**.59**	.06	-.06	.04	**.78**	-.03
22.	-.06	**(.30)**	**.60**	.00	-.17	.08	**.76**	-.09	-.05	.00	**.73**	.15	-.11	.13	**.82**	.07
4.	-.15	.28	.05	**.39**	-.05	.02	.11	**.60**	-.17	.13	.03	**.56**	-.07	.18	.06	**.65**
10.	.04	-.03	.04	**.75**	.14	.12	.01	**.62**	.06	.13	.12	**.46**	.01	.13	.05	**.54**
17.	.08	-.26	.14	**.47**	-.20	.19	.06	**.58**	**(-.33)**	.15	.03	**.72**	-.26	.28	.08	**.48**

Note. Pattern coefficients ≥ |.30| are in bold. In cases where an item had a pattern coefficient ≥ |.30| on a factor/subscale that it was not intended to measure, the coefficient has been identified in brackets. PS = Personal standards; COM = Concern over mistakes; PPP = Perceived parental pressure; PCP = Perceived coach pressure.

[a] Dunn et al., 2002, n = 174 males (M age = 18.24 years, SD = 0.66).

[b] Dunn et al., 2006, sample 1. n = 276 males (M age = 18.29 years, SD = 0.73).

[c] Dunn et al., 2006, sample 2. n = 229 males (M age = 14.15 years, SD = 1.03).

[d] Dunn et al., 2006, sample 3. n = 135 males and 86 females (M age = 21.45 years; SD = 2.29).

Procedure

The Human Research Ethics Committee of the Faculty of Physical Education and Recreation at the University of Alberta granted clearance to conduct the study. The captains of a men's and a women's Ultimate Frisbee club team that had competed at the 2004 Canadian national club championships were contacted via electronic mail to introduce the study and to obtain permission to recruit their team members as potential participants.[4] Once the captains of both teams gave the researcher permission to approach their respective teams, the researcher contacted and presented the study individually to all team members by electronic mail. The athletes were informed that the purpose of the study was to examine athletes' perceptions of the competitive beliefs, attitudes, and experiences surrounding motivation in sport. Additionally, the researcher explained that participation consisted of completing two questionnaires, one of which would only take a couple minutes to complete (i.e., the demographic questionnaire) and one that would take approximately 1 hour to complete (i.e., one of the three versions of the SRS). Both instruments were attached to each individual's introductory electronic mail so that the participants could preview what participation in the study would entail. The athletes were told that their participation was voluntary and that their standing on their respective teams would not be affected by their decision to participate or not. Participants were asked to return their completed inventories to the researcher via electronic mail at their earliest convenience. A $10 gift certificate to a local restaurant was offered as an incentive to participate (which participants received upon completion of the instruments).

[4] It is important to note that, as opposed to utilizing standard coaches, club level Ultimate Frisbee teams are usually organized and coached by team members who are designated as captains.

Data Analysis

Each participant responded to one of the three SRS versions and the resulting similarity ratings were transferred into individual similarity data matrices. In doing so, the scoring of each participant's ratings was reversed for the purposes of MDS such that lower scores (after reverse scoring) represented closer measures of proximity. The individual similarity matrices were then compiled into a single data matrix for each respective version of the SRS and subjected to group-level MDS analysis developed by Carroll and Chang (1970). Thus, three separate MDS analyses were conducted (i.e., one for each data set that corresponded to each of the three SRS versions). Given that the participants were not instructed to use any specific "psychological constructs" to guide their similarity ratings, weighted MDS procedures were employed because such procedures are appropriate when it is possible that participants used different perceptual or cognitive processes to guide their similarity ratings (Young & Harris, 1993).

Interpretability and parsimony are the major criteria that guide the selection of the dimensionality of the MDS solution that best represents the latent structure of the data (Hair et al., 1998). In general, lower dimensional solutions are preferred over higher dimensional solutions unless the addition of dimensions provides greater clarity to understanding the data (Davison, 1983). Researchers also use two goodness-of-fit indices (a stress index and an R^2 value) as indicators of how well data fits a given solution. The stress index ranges from zero to 1.0 with lower values representing better fits between data and MDS solutions (Kruskal, 1964). The R^2 value can be interpreted as the proportion of variance in the data that is accounted for by the MDS solution.

There is no minimum sample size required to produce meaningful MDS solutions because such solutions can be produced from a single participant's responses (Hair et al., 1998). However, Kruskal and Wish (1978) indicate that degenerate MDS solutions can be produced when the number of items included in the analysis is less than four times the dimensionality of the final solution. Degenerate solutions do not provide valid/trustworthy representations of input similarity data and usually occur when the MDS analysis is unable to differentiate between items (Hair et al.). Given that MDS solutions with four or more dimensions are often difficult to interpret (Hair et al.), only MDS solutions with three dimensions or less were considered in the present analyses. With this restriction in dimensionality, the item-to-dimensionality ratios of each analysis met or exceeded Kruskal and Wish's recommended minimum criterion (i.e., 4:1) to avoid the production of degenerate solutions.

Results

Dimensionality of Responses to SRS Versions

One-, two-, and three-dimensional solutions were compared to determine the MDS solution that best represented the latent structure of the responses within each of the three SRS data sets. For all three data sets, the one-dimensional solutions grouped the items in each analysis into two clusters at opposing ends of a single dimension. Hair et al. (1998) describe solutions with this type of object-clustering as degenerate. As a result, the unidimensional solutions produced from each SRS version were not considered as acceptable representations of the participants' similarity ratings.

Table 5-2 displays the stress indices and R^2 values associated with the two- and three-dimensional solutions produced from each SRS version. In all cases, the stress

indices associated with the three-dimensional solutions for the responses to SRS1, SRS2, and SRS3 were lower than the stress values produced in the corresponding two-dimensional solutions. Moreover, the R^2 values associated with the three dimensional solutions were all greater than or equal to the R^2 values produced from the two-dimensional MDS analyses. Most importantly, the three-dimensional solutions were more parsimonious and more interpretable than the two-dimensional solutions for each SRS data set. Collectively, these results suggested that the three-dimensional solutions provided a better representation of the latent dimensionality of the similarity data from each SRS version than the two-dimensional solutions.

As indicated in Table 5-3, there was a high degree of fit between each participant's similarity ratings and the respective three-dimensional group-level solutions for each version of the SRS. That is, across all three SRS versions, each participant's respective idiographic MDS solution had a correlation of .40 or greater with the final group-level solution. These correlations indicate that the group-level solution did a good job of capturing the cognitive schemas upon which the participants' based their similarity ratings (Fisher, 1979).

The verbatim item descriptors and corresponding coordinates (i.e., locations) for each of the three-dimensional solutions are presented in Tables 5-4, 5-5, and 5-6. The corresponding graphical representations of these solutions are presented in Figures 5-1, 5-2, and 5-3. In these figures, each point (represented by a small circle) represents the location of an item within the three-dimensional space (as defined by the item descriptor number and corresponding coordinates presented in Tables 5-4, 5-5, and 5-6). The lines

drawn down from each item in these figures indicate the coordinates of each item on the horizontal and inset axes (i.e., dimensions 1 and 3) of each solution.

Table 5-2

Stress Indices and R^2 Values Associated with the Two- and Three-Dimensional Solutions Produced from Each SRS Version

	Two-Dimensional Solution		Three-Dimensional Solution	
SRS Version	Stress	R^2	Stress	R^2
SRS1	.26	.75	.22	.75
SRS2	.33	.47	.25	.57
SRS3	.34	.42	.26	.48

Table 5-3

Degree of Fit Between Individual Participant's and Group-Level Weighted Multidimensional Solutions

Correlation (R) between athletes and group solution	SRS1		SRS2		SRS3	
	n	%	*n*	%	*n*	%
< .40	–	–	–	–	–	–
.40 – .49	–	–	1	11	1	8
.50 – .59	–	–	1	11	2	17
.60 – .69	1	8	1	11	3	25
.70 – .79	3	25	1	11	5	42
.80 – .89	2	17	5	56	1	8
.90 – 1.00	6	50	–	–	–	–

Interpretation of Group Space Item Clusters in Each MDS Analysis

Item clusters for SRS1. Twelve participants (six females and six males) completed SRS1. Examination of the coordinates in Table 5-4 (as graphically represented in Figure 5-1) reveals that the MDS analysis produced a group-space solution with four item clusters. One cluster contained three DAA-Sport items (items 1, 2, and 3) that focused on athletes' uncertainty about the degree to which their training adequately prepared them for competition. A second cluster contained three DAA-Sport items (items 4, 5, and 6) that represented athletes' dissatisfaction toward the degree to which their training adequately prepared them for competition. Examination of Table 5-4 and Figure 5-1 reveals that these clusters are separated by their coordinates along dimension 3. This indicates that these two item clusters represent distinct, yet related, constructs. The third cluster contained four ORG-Sport items (items 7, 8, 9, and 10) that focused on athletes' tendency to have and follow pre-competitive routines. Finally, the fourth cluster contained two ORG-Sport items (items 11 and 12) that focused on athletes' tendencies to set and develop plans to follow during competition. As with the two clusters that contained DAA-Sport items, these two ORG-Sport item clusters were separated only by their scores on one of the three dimensions (i.e., dimension 2) which is indicative of the similarity between the constructs represented by each cluster.

Item clusters for SRS2. Nine athletes (three females and six males) responded to SRS2. The coordinates produced through MDS analysis of these responses are presented in Table 5-5 (and graphically displayed in Figure 5-2). This analysis revealed the presence of six distinct item clusters. Five of these item clusters reflected concern over mistakes (i.e., items 4, 5, and 6), perceived parental pressure (i.e., items 7, 8, and 9),

Table 5-4

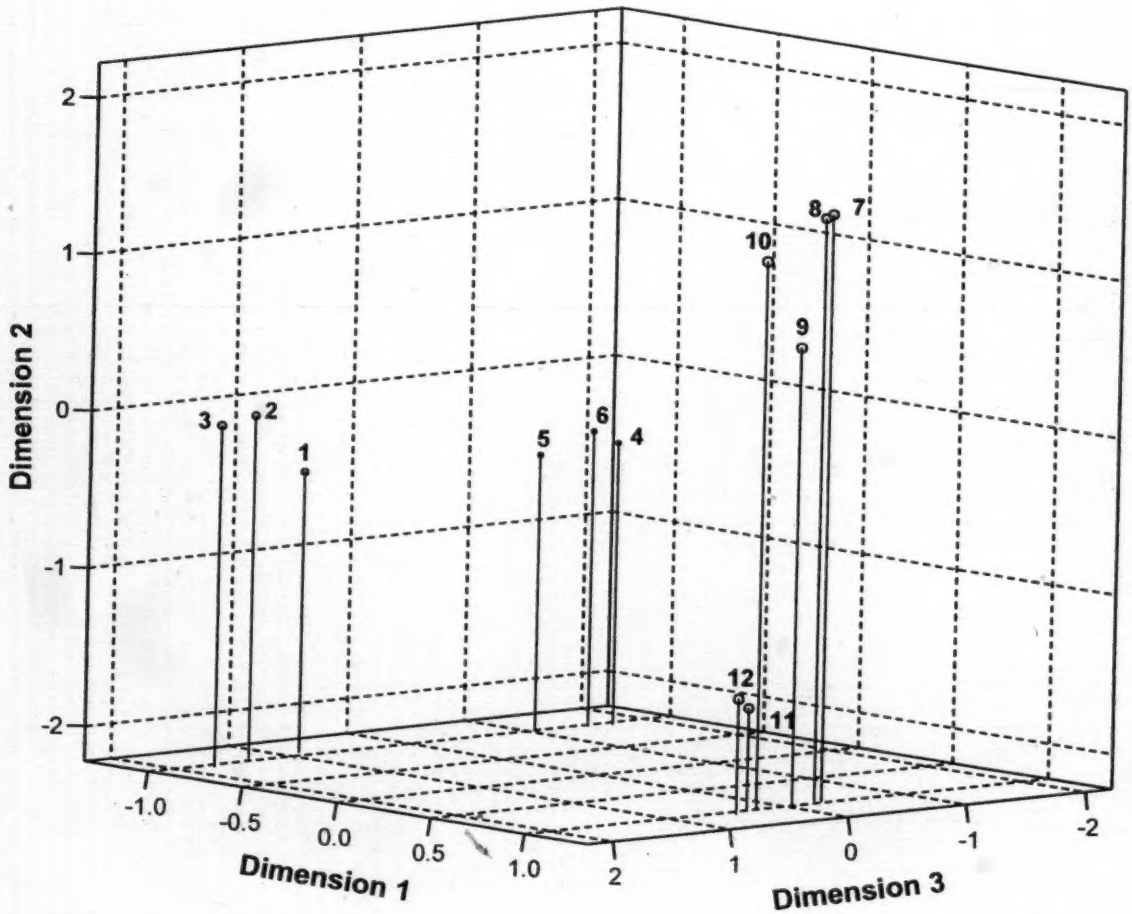
Item Labels, Verbatim Item Descriptors, and Dimension Coordinates for the Three-Dimensional Solution (Shown in Figure 5-1) that Represented Participants' Responses to SRS1

Item number	Subscale	Item descriptor	Dimension 1	Dimension 2	Dimension 3
1	DAA	I usually feel uncertain as to whether or not my training effectively prepares me for competition.	-1.07	-0.45	0.83
2	DAA	I usually feel unsure about the adequacy of my pre-competition practices.	-1.05	-0.05	1.29
3	DAA	I usually have trouble deciding when I have practiced enough heading into a competition.	-0.96	-0.06	1.72
4	DAA	Prior to competition, I rarely feel satisfied with my training.	-0.95	-0.44	-1.66
5	DAA	I rarely feel that my training fully prepares me for competition.	-0.99	-0.48	-1.05
6	DAA	I rarely feel that I have trained enough in preparation for a competition.	-0.98	-0.36	-1.48
7	ORG	On the day of competition I have a routine that I try to follow.	0.98	1.50	-0.35
8	ORG	I have and follow a pre-competitive routine.	0.95	1.47	-0.33
9	ORG	I follow pre-planned steps to prepare myself for competition.	1.05	0.70	0.02
10	ORG	I follow a routine to get myself into a good mindset going into competition.	1.00	1.25	0.24
11	ORG	I develop plans that dictate how I want to perform during competition.	0.96	-1.58	0.27
12	ORG	I set plans that highlight the strategies I want to use when I compete.	1.05	-1.49	0.50

Note. DAA = Doubts about actions; ORG = Organization.

Figure 5-1

Graphical display of the three-dimensional group-space solution chosen to represent the participants' responses to SRS1.



perceived coach pressure (i.e., items 10, 11, and 12), doubts about actions (i.e., items 13, 14, and 15), and organization (i.e., items 16, 17, 18). The personal standards items (i.e., items 1, 2, and 3) were less tightly grouped than the other five item-clusters, but nevertheless formed a clear and unique cluster. These results provide evidence that all the items in this analysis were functioning as expected given that each item was clustered according to theoretical expectations and reflected the four original Sport-MPS subscales (i.e., PS-Sport, COM-Sport, PPP-Sport, and PCP-Sport) and the new DAA-Sport and ORG-Sport subscales.

Item clusters for SRS3. Twelve athletes (six females and six males) responded to SRS3. The coordinates for the group-level solution produced by the MDS analysis of the participants' responses are presented in Table 5-6 (and graphically represented in Figure 5-3). Similar to the SRS2 group-level solution, the SRS3 group-level solution revealed five distinct and tightly grouped item clusters representing personal standards (i.e., items 1, 2, and 3), perceived parental pressure (i.e., items 7, 8, and 9), perceived coach pressure (i.e., items 10, 11, and 12), doubts about actions (i.e., items 13, 14, and 15), and organization (i.e., items 16, 17, 18). The sixth cluster contained the three concern over mistakes items (i.e., items 4, 5, and 6) and although the items were less tightly grouped in comparison to the other five clusters, they were sufficiently close to produce a clear and unique cluster. These findings indicate that each item was grouped by participants in accordance with theoretical expectations.

Table 5-5

Item Labels, Verbatim Item Descriptors, and Dimension Coordinates for the Three-Dimensional Solution (Shown in Figure 5-2) that Represented Participants' Responses to SRS2

Item number	Subscale	Item descriptor	Dimension		
			1	2	3
1	PS	I think I expect higher performance and greater results in my daily sport-training than most players.	0.76	1.38	-0.30
2	PS	I have extremely high goals for myself in my sport.	0.12	1.55	0.75
3	PS	I set higher achievement goals than most athletes who play my sport.	0.09	1.58	0.65
4	COM	If I fail in competition, I feel like a failure as a person.	-.94	1.33	-0.18
5	COM	If I do not do well all the time in competition, I feel that people will not respect me as an athlete.	-1.18	0.88	-0.36
6	COM	People will probably think less of me if I make mistakes in competition.	-1.18	0.75	-0.53
7	PPP	In competition, I never feel like I can quite meet my parents' expectations.	-1.06	-1.14	0.53
8	PPP	I feel like I am criticized by my parents for doing things less than perfectly in competition.	-1.03	-1.07	0.85
9	PPP	In competition, I never feel like I can quite live up to my parents' standards.	-1.02	-1.02	0.76
10	PCP	I feel like my coach criticizes me for doing things less than perfectly in competition.	-0.59	-1.34	-0.28
11	PCP	Only outstanding performance in competition is good enough for my coach.	-0.69	-1.16	-0.31
12	PCP	I feel like I can never quite live up to my coach's standards.	-0.62	-1.12	-0.62
13	DAA	I usually feel uncertain as to whether or not my training effectively prepares me for competition.	1.08	0.00	-1.68
14	DAA	I usually feel unsure about the adequacy of my pre-competition practices.	1.06	-0.16	-1.61
15	DAA	I usually have trouble deciding when I have practiced enough heading into a competition.	0.96	-0.14	-1.79
16	ORG	On the day of competition I have a routine that I try to follow.	1.42	-0.30	1.52
17	ORG	I have and follow a pre-competitive routine.	1.46	-0.08	1.37
18	ORG	I follow pre-planned steps to prepare myself for competition.	1.42	0.05	1.24

Note. PS = Personal standards; COM = Concern over mistakes; PPP = Perceived parental pressure; PCP = Perceived coach pressure; DAA = Doubts about actions; ORG = Organization.

Figure 5-2

Graphical display of the three-dimensional group-space solution chosen to represent the participants' responses to SRS2.

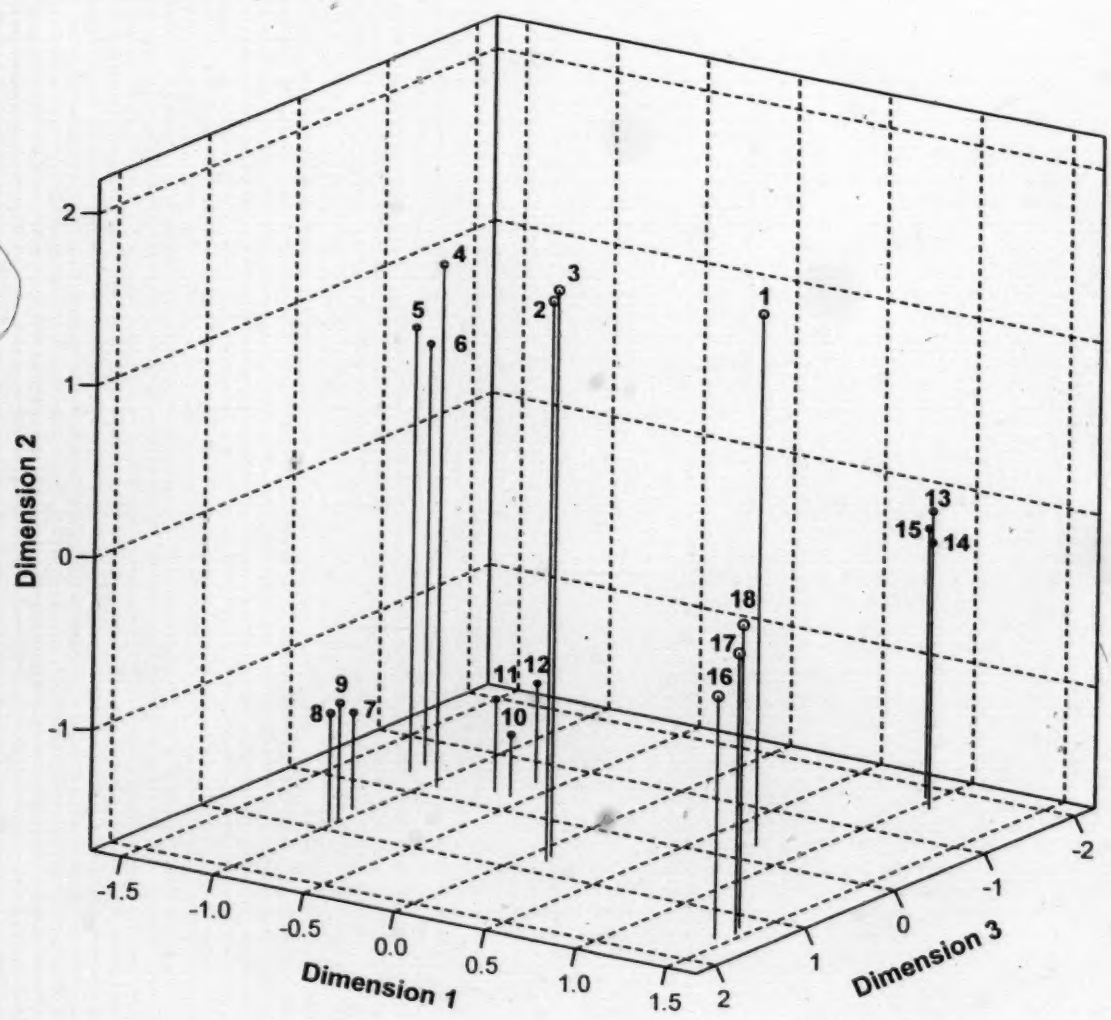


Table 5-6

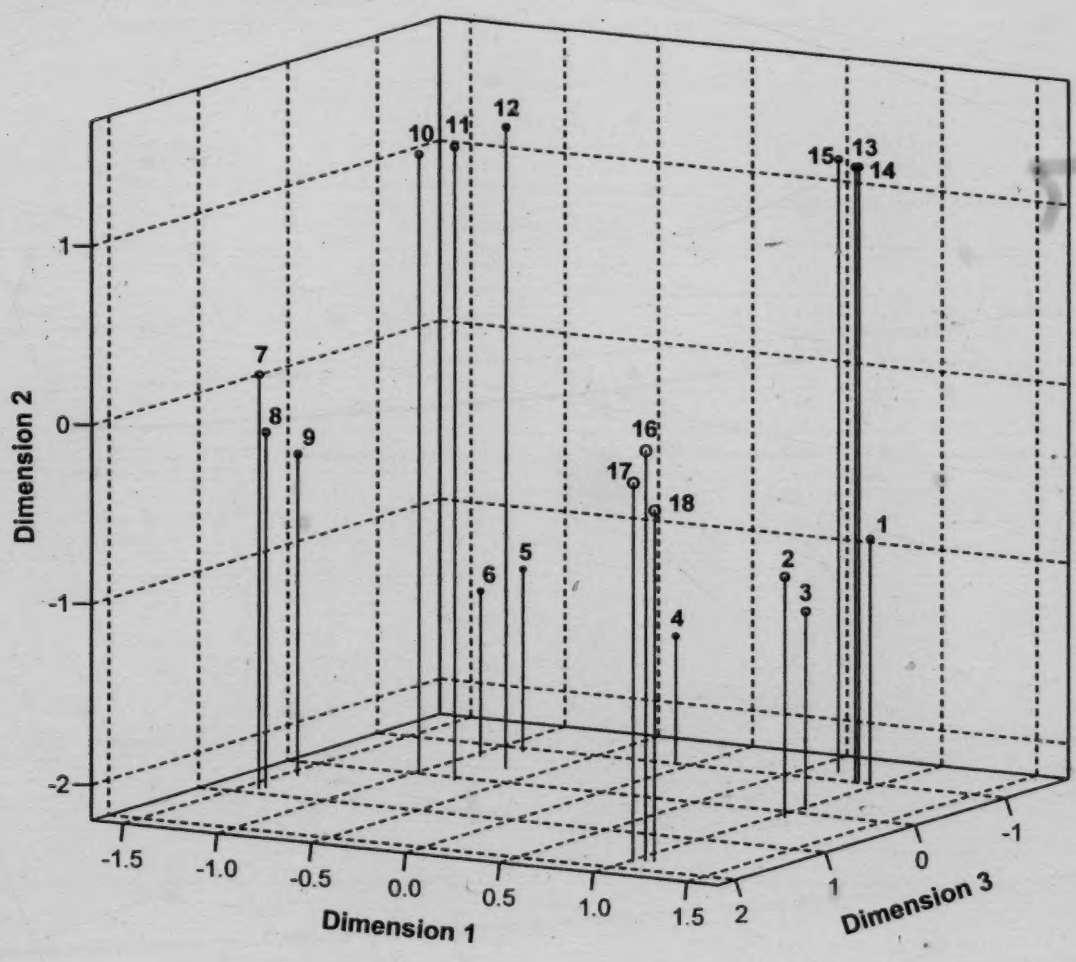
Item Labels, Verbatim Item Descriptors, and Dimension Coordinates for the Three-Dimensional Solution (Shown in Figure 5-3) that Represented Participants' Responses to SRS3

Item number	Subscale	Item descriptor	Dimension		
			1	2	3
1	PS	I think I expect higher performance and greater results in my daily sport-training than most players.	0.94	-0.85	-1.03
2	PS	I have extremely high goals for myself in my sport.	1.05	-0.87	0.16
3	PS	I set higher achievement goals than most athletes who play my sport.	1.03	-1.10	-0.12
4	COM	If I fail in competition, I feel like a failure as a person.	-0.11	-1.51	-1.06
5	COM	If I do not do well all the time in competition, I feel that people will not respect me as an athlete.	-0.86	-1.19	-0.92
6	COM	People will probably think less of me if I make mistakes in competition.	-0.96	-1.28	-0.66
7	PPP	In competition, I never feel like I can quite meet my parents' expectations.	-1.42	0.10	0.85
8	PPP	I feel like I am criticized by my parents for doing things less than perfectly in competition.	-1.40	-0.22	0.81
9	PPP	In competition, I never feel like I can quite live up to my parents' standards.	-1.43	-0.41	0.39
10	PCP	I feel like my coach criticizes me for doing things less than perfectly in competition.	-0.96	1.25	0.01
11	PCP	Only outstanding performance in competition is good enough for my coach.	-0.75	1.33	0.06
12	PCP	I feel like I can never quite live up to my coach's standards.	-0.70	1.37	-0.40
13	DAA	Prior to competition, I rarely feel satisfied with my training.	0.85	1.22	-1.05
14	DAA	I rarely feel that my training fully prepares me for competition.	0.87	1.22	-1.05
15	DAA	I rarely feel that I have trained enough in preparation for a competition.	0.68	1.22	-1.22
16	ORG	I follow a routine to get myself into a good mindset going into competition.	1.06	0.08	1.73
17	ORG	I develop plans that dictate how I want to perform during competition.	1.01	-0.10	1.78
18	ORG	I set plans that highlight the strategies I want to use when I compete.	1.10	-0.26	1.71

Note. PS = Personal standards; COM = Concern over mistakes; PPP = Perceived parental pressure; PCP = Perceived coach pressure; DAA = Doubts about actions; ORG = Organization.

Figure 5-3

Graphical display of the three-dimensional group-space solution chosen to represent the participants' responses to SRS3.



Discussion

The present phase of the dissertation had two purposes: (a) to utilize multidimensional scaling to conduct an initial examination of the latent dimensionality of the new DAA-Sport and ORG-Sport items, and (b) to investigate how these new items related to the existing subscales of the Sport-MPS. Overall, the results of the MDS analyses revealed that each of the DAA-Sport and ORG-Sport items represented constructs similar in nature to the other items from their same item-set, but unique from the constructs represented by other item-sets (see Figures 5-1, 5-2, and 5-3). This is not surprising given the theoretical differences between these two dimensions' domain specifications and the perfectionism dimensions represented by the four original Sport-MPS subscales (see Chapters 1, 2, and 3).

The results of the MDS analysis that only included DAA-Sport and ORG-Sport items (i.e., the analysis of responses to SRS1 [see Table 5-4 and Figure 5-1]) suggested the possible presence of two components within the DAA-Sport and ORG-Sport item sets, respectively. This analysis partitioned the DAA-Sport items into two distinct but related clusters. One cluster (i.e., items 1, 2, and 3) was comprised of three DAA-Sport items that focused on athletes' uncertainty towards the adequacy of their training prior to competition ("I usually feel uncertain as to whether or not my training effectively prepares me for competition", "I usually feel unsure about the adequacy of my pre-competition practices", and "I usually have trouble deciding when I have practiced enough heading into a competition"). The second doubts about actions cluster (i.e., items 4, 5, and 6) was similar to the first cluster but contained items that focused on athletes' dissatisfaction with the adequacy of their training ("Prior to competition, I rarely feel

satisfied with my training", "I rarely feel that my training fully prepares me for competition", and "I rarely feel that I have trained enough in preparation for a competition"). As examined previously in Phase 1 of the dissertation (i.e., Chapter 3), this finding questions whether doubts about actions is a unidimensional or multidimensional construct.

The MDS analysis of SRS1 data also grouped the ORG-Sport items into two similar, yet distinct, clusters. One cluster (i.e., items 7, 8, 9, and 10) appeared to represent the tendency of athletes to have and follow pre-performance routines ("On the day of competition I have a routine that I try to follow", "I have and follow a pre-competitive routine", "I follow pre-planned steps to prepare myself for competition", and "I follow a routine to get myself into a good mindset going into competition"). The second ORG-Sport cluster (i.e., items 11 and 12) contained items that reflected athletes' tendency to set plans that guided performance during competition ("I develop plans that dictate how I want to perform during competition" and "I set plans that highlight the strategies I want to use when I compete"). These results suggest that more research is required to further clarify the latent structure of the DAA-Sport and ORG-Sport items.

Although not a primary purpose of the present study, the results of the MDS analyses conducted on the participants' responses to SRS2 and SRS3 also provided evidence supporting the proposed latent dimensionality of the original Sport-MPS. That is, Dunn and colleagues (Dunn et al., 2006; Dunn et al., 2002) have utilized exploratory factor analysis to produce evidence that the latent structure of the original Sport-MPS is best represented by four subscales reflecting personal standards, concern over mistakes, perceived parental pressure, and perceived coach pressure. The present MDS analyses

conducted upon the SRS2 and SRS3 data revealed these four constructs using the marker variables that were selected. The combination of Dunn and colleagues' factor analytic results with the present MDS results provide strong support for the proposed latent dimensionality of the Sport-MPS from a multi-method, multi-analytic perspective.

Results of the MDS analyses conducted on the SRS2 and SRS3 data sets (see Tables 5-5 and 5-6 and Figures 5-2 and 5-3) revealed that the DAA-Sport and ORG-Sport items represent constructs that are clearly separable from those constructs represented by the Sport-MPS marker items. These findings indicate that the DAA-Sport and ORG-Sport items may indeed represent unique constructs that tap into aspects of perfectionism over and above the four original dimensions of the Sport-MPS (i.e., PS-Sport, COM-Sport, PPP-Sport, and PCP-Sport). This is an important finding given that the present dissertation proposes that the Sport-MPS does not provide fully representative assessments of perfectionism in sport because the instrument does not assess the perfectionist characteristics represented by the DAA-Sport and ORG-Sport item-sets.

It should be reiterated that respondents were not given any information regarding the potential dimensionality of the items that were presented during the similarity rating process. Such a protocol allows for findings to emerge from the participants' perceptions that are free of contamination from researchers' expectations (Dunn, 1999; Hair et al., 1998; Schiffman et al., 1981). As a result, the current MDS analyses provide strong evidence that the new DAA-Sport and ORG-Sport item-sets represent distinct constructs when evaluated in the presence of each other (Table 5-4 and Figure 5-1) and in the presence of other established Sport-MPS dimensions (Tables 5-5 and 5-6 and Figures 5-2 and 5-3). Given that (a) the constructs represented by these new DAA-Sport and ORG-

Sport items are proposed to represent core components of perfectionism in sport that are not currently assessed by the Sport-MPS (see Chapters 1, 2, and 3), and (b) judges have provided content-validity evidence supporting the use of these items (see Chapter 4), the present results suggest that there may be value in adding these new items to the Sport-MPS to allow for enhanced assessment of perfectionism in sport.

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Chapter 6

Examining the Latent Dimensionality of the Sport Multidimensional Perfectionism Scale 2

The results of the multidimensional scaling analyses conducted in Chapter 5 indicated that the newly developed doubts about actions and organization items were suitable (at a structural level) to be included in a revised version of the *Sport Multidimensional Perfectionism Scale* (Sport-MPS: Dunn et al., 2006; Dunn, Causgrove Dunn, & Syrotuik, 2002). According to perfectionism theory (see Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963), this revised version of the Sport-MPS (henceforth labeled the *Sport Multidimensional Perfectionism Scale 2* [Sport-MPS-2]) will produce more representative assessments of individuals' perfectionist orientations in sport than assessments produced by the Sport-MPS (see Chapter 1).

Dunn and colleagues (Dunn et al., 2006; Dunn et al., 2002) have established a considerable amount of evidence supporting the four dimensional structure of the original Sport-MPS (i.e., dimensions representing *Personal Standards* [PS-Sport], *Concern Over Mistakes* [COM-Sport], *Perceived Parental Pressure* [PPP-Sport], and *Perceived Coach Pressure* [PCP-Sport]). Moreover, the results of the multidimensional scaling analyses (MDS) presented in Chapter 5 indicated that the new doubts about actions (DAA-Sport) and organization (ORG-Sport) items may represent unique dimensions within the original latent structure of the Sport-MPS. However, the MDS results were less clear in regards to whether DAA-Sport and ORG-Sport should be each treated as unidimensional or bidimensional constructs. Thus, the results of Chapter 5 suggested that the Sport-MPS-2 may be comprised of six or eight subscales representing the four original Sport-MPS

subscales (i.e., PS-Sport, COM-Sport, PPP-Sport, and PCP-Sport) as well as the newly proposed DAA-Sport and ORG-Sport subscales.

Smith and McCarthy (1995) argue that evidence of the latent dimensionality of refined instruments should be established before such instruments are used for research purposes. Therefore, the purpose of this phase of the construct validation process was to extend the initial investigation of the latent dimensionality of the Sport-MPS-2 (i.e., Chapter 5) by conducting an initial examination of the inter-item structure of all items to be included in the new Sport-MPS-2. In particular, the key objective of the present phase of the dissertation was to determine the extent to which DAA-Sport and ORG-Sport items formed identifiable constructs when examined in conjunction with the original Sport-MPS items. Factor analysis was utilized to achieve this objective given that the technique has traditionally been used to produce similar forms of construct validity evidence (Messick, 1989).

Method

Participants

Participants were 116 female (*M* age = 21.39 years, *SD* = 2.46) and 135 male (*M* age = 21.97 years, *SD* = 2.25) Canadian Intercollegiate Sport (CIS) student-athletes. These athletes were members of a Canadian university's varsity sport program from seven team sports: Canadian football (60 males), basketball (11 females, 14 males), soccer (19 females, 19 males), field hockey (16 females), ice hockey (24 females, 26 males), volleyball (15 females, 16 males), and rugby (31 females). All of the student-athletes were pursuing undergraduate academic degrees with the exception of eight

athletes who were in graduate degree programs. On average, the athletes had 2.26 years experience competing at the post-secondary varsity level (SD = 1.50).

Measures

Participants completed a demographic questionnaire and the Sport-MPS-2. The demographic inventory asked participants to indicate their gender, age, the varsity team that they competed on, and the number of years that they had competed at the intercollegiate varsity level.

The Sport Multidimensional Perfectionism Scale 2. The Sport-MPS-2 contains the 30 items from the original Sport-MPS (Dunn et al., 2002), the 12 newly constructed items designed to assess doubts about actions and organization, and one additional item designed to measure perceived coach pressure. Appendix G contains the item numbers and verbatim item descriptions of all 43 items that were included in the Sport-MPS-2. The Sport-MPS-2 utilizes the same instructions and response format employed in the original Sport-MPS. That is, the instructions inform respondents that the purpose of the questionnaire is to determine how athletes "view certain aspects of their competitive experiences in sport." Respondents are asked to rate the extent to which they agree with each item using a 5-point scale (1 = s*trongly disagree*; 5 = s*trongly agree*).

Exploratory factor analytic studies (i.e., Dunn et al., 2006; Dunn et al., 2002) have provided evidence that the 30 items of the original Sport-MPS reflect four subscales (PS-Sport [seven items], COM-Sport [eight items], PPP-Sport [nine items], and PCP-Sport [six items]) each of which possess adequate levels of internal consistency (i.e., alphas ≥ .70). However, Dunn et al.'s (2006) results indicated that some of the perceived coach pressure items occasionally had meaningful cross-loadings (i.e., pattern coefficients

ranging from |.30| to |.39|) on a second factor across three independent samples. Dunn et al. (2006) indicated that such "double loading" items are not desirable from a factor analytic perspective. Consequently, in the event that certain PCP-Sport items continued to demonstrate simple structure problems (and therefore become candidates for removal from the inventory [Floyd & Widaman, 1995]) one additional item was constructed to measure PCP-Sport and included in the Sport-MPS-2 (i.e., Sport-MPS-2 item 17: "I feel like I can never quite meet my coach's expectations"). Thus, the final version of the Sport-MPS-2 contained 43 items that were intended to measure personal standards (7 items), concern over mistakes (8 items), perceived parental pressure (9 items), perceived coach pressure (7 items), doubts about actions (6 items), and organization (6 items). Higher composite scores reflect higher perfectionist tendencies on each subscale.

Procedure

Clearance to conduct this study was granted by the Human Research Ethics Committee of the Faculty of Physical Education and Recreation at the University of Alberta. The head coaches of the teams were contacted by phone, e-mail, or letter to obtain permission to recruit their team members as potential participants. Once permission was secured from the coaches, the researcher met with and presented the study to the members of each team at team meetings. The athletes were informed that the purpose of the study was to "examine athletes' attitudes, beliefs, and opinions regarding their athletic performance." The researcher explained that participation consisted of completing a brief questionnaire packet and that all participation was voluntary. Written informed consent was obtained from all athletes prior to participation. All testing was conducted at team meetings in classroom settings at least 24 hours prior to competition

during their respective regular season schedules. Coaches were not present during test administration. The demographic questionnaire was always presented prior to the Sport-MPS-2.

Results

Preliminary Data Analysis

Given that correlation matrices become more stable as sample size increases (Gorsuch, 1983), it was desirable from a factor analytic perspective to combine the responses of the male and female athletes into a single sample. Consequently, Box's *M* test was conducted upon the male and female participants' responses to the Sport-MPS-2 to determine if the covariance matrices provided by males and females were homogeneous. This test produced a non-significant test statistic (Box's $M = 1167.867$, F [903, 178395.7] = 1.064, $p = .088$) indicating that the covariance matrices of females' and males' responses on the Sport-MPS-2 could be legitimately combined into a single dataset for subsequent analyses.

Examination of the Latent Dimensionality of the Sport-MPS-2

Confirmatory factor analysis. Maximum likelihood confirmatory factor analyses (CFA) using LISREL 8.2 (Jöreskog & Sörbom, 1996a) were conducted on the inter-item covariance matrix (produced by PRELIS2: Jöreskog & Sörbom, 1996b) of the participants' Sport-MPS-2 responses. Two models were tested. The first model contained six latent variables: namely PS-Sport (items 1, 8, 18, 22, 24, 34, 37), COM-Sport (items 2, 10, 16, 25, 29, 33, 40, 43), PPP-Sport (items 4, 7, 11, 15, 20, 26, 30, 39, 41), PCP-Sport (items 6, 13, 17, 23, 27, 31, 36), DAA-Sport (items 3, 12, 14, 21, 32, 38), and ORG-Sport (items 5, 9, 19, 28, 35, 42). This model was designed to reflect the factor

structure of the four original Sport-MPS subscales (i.e., PS-Sport, COM-Sport, PPP-Sport, and PCP-Sport) as presented by Dunn and colleagues (Dunn et al., 2006; Dunn et al., 2002) and the expected composition of the two new subscales designed in Chapter 4 (i.e., DAA-Sport and ORG-Sport). The second model contained eight latent variables. The item composition of the PS-Sport, COM-Sport, PPP-Sport, and PCP-Sport factors in this second model was identical to the first model. However, on the basis of the MDS results described in Chapter 5 (see Table 5-4 and Figure 5-1), DAA-Sport and ORG-Sport were each divided into two latent variables: DAA-Sport-1 (items 3, 12, and 38), DAA-Sport-2 (items 14, 21, and 32), ORG-Sport-1 (items 5, 9, 19, and 28), and ORG-Sport-2 (items 35 and 42).

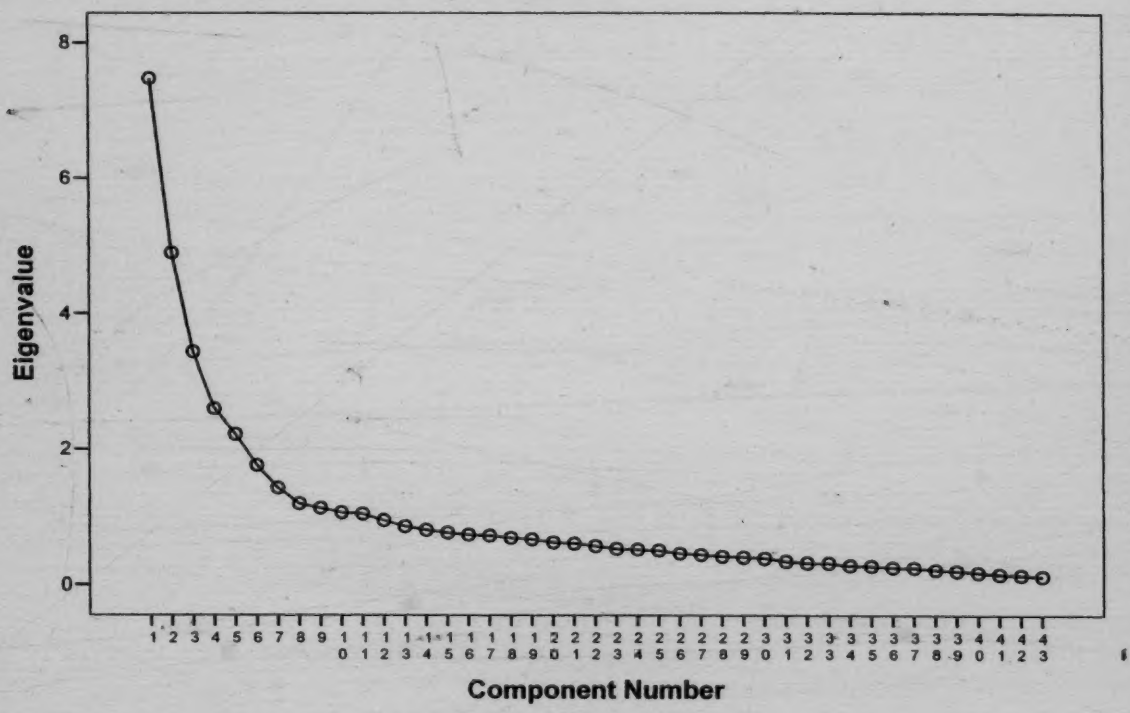
Both absolute fit indices (χ^2 test, GFI [Jöreskog & Sörbom, 1981], and RMSEA [Steiger, 1990]) and comparative/incremental fit indices (NNFI [Bentler & Bonett, 1980] and CFI [Bentler, 1990]) were used to evaluate model goodness of fit. None of these fit indices, with the exception of the RMSEA value (.060 in the six-factor model and .057 in the eight-factor model) indicated that the six- or the eight-factor model provided an adequate fit to the data. Specifically, the χ^2 statistic associated with each model was significant at $p < .00001$ and the GFI, NNFI, and CFI indices associated with each model were all < .90. Given that (a) prior results or research do not suggest any clear alternative models that could be tested, and (b) the researcher's reluctance to search for a better fitting model on the basis of modification indices due to possible problems associated with capitalization on chance (cf. MacCallum, Roznowski, & Necowitz, 1992), exploratory factor analytic procedures were used to re-examine the latent structure of the items (see Dunn et al., 2006; Gorsuch, 2003; Wilson, Sullivan, Myers, & Feltz, 2004).

Principal components analyses. A principal components analysis (PCA) was initially conducted to assist in the determination of the number of factors. This analysis produced eleven eigenvalues > 1.0 ($\lambda_1 = 7.28$, $\lambda_2 = 4.84$, $\lambda_3 = 3.33$, $\lambda_4 = 2.50$, $\lambda_5 = 2.03$, $\lambda_6 = 1.76$, $\lambda_7 = 1.42$, $\lambda_8 = 1.19$, $\lambda_9 = 1.13$, $\lambda_{10} = 1.06$, $\lambda_{11} = 1.03$). Following factor analysts' recommendations (e.g., Fabrigar, Wegener, MacCallum, & Strahan, 1999; Preacher & MacCallum, 2003; Velicer, Eaton, & Fava, 2000), the number of factors to retain was determined through examination of the resulting eigenvalue scree plot (Cattell, 1978), parallel analysis (Horn, 1965), and a review of relevant theory and research (Fabrigar et al., 1999).

Using Cattell's (1978) protocol, examination of the eigenvalue scree plot (see Figure 6-1) suggested the retention of six or seven factors. The eleven eigenvalues > 1.0 were also compared with criterion eigenvalues produced through parallel analysis. Using the parallel analysis procedure described by Lautenschlager (1989), the first six eigenvalues produced through the PCA were greater than the corresponding criterion eigenvalues that would be expected from random data sets of corresponding sample size and variables—suggesting that six factors be retained (see Lautenschlager for a more detailed explanation of the use of parallel analysis in determining the number of factors). Nevertheless, given that the results of one of the multidimensional scaling analyses in Chapter 5 suggested that DAA-Sport and ORG-Sport may be bidimensional constructs (see Table 5-4 and Figure 5-1), six-, seven-, and eight-factor solutions were examined.

Figure 6-1

Scree plot of the eigenvalues for Sport-MPS-2 data.



Principal axes analyses. Three separate principal axes (PA) analyses were conducted on the Sport-MPS-2 inter-item correlation matrix (see Tabachnick & Fidell, 1996) to produce six-, seven-, and eight-factor solutions. Each solution was rotated orthogonally using varimax rotation and transformed obliquely with direct oblimin (delta = 0). The orthogonal and oblique solutions pertaining to each factor solution were compared on the basis of Thurstone's (1947) principle of simple structure (i.e., the degree to which each item in a solution has a meaningful pattern coefficient on only one factor). Any pattern coefficient $\geq |.30|$ was deemed to be meaningful (see Gorsuch, 1983).

Comparisons of the six-, seven-, and eight-factor orthogonal and oblique solutions revealed that the oblique solutions displayed better simple structure than the orthogonal solutions across all three sets of analyses.[1] As a result, the oblique six-, seven-, and eight-factor solutions were retained (see Tables 6-1, 6-2, and 6-3 respectively) for further examination. A summary of the simple structure problems associated with each of the three oblique solutions is contained in Table 6-4.

The factors in the six-factor solution (see Table 6-1) were the easiest to interpret from a theoretical perspective. Specifically, the six factors that were anticipated—PS-Sport, COM-Sport, PPP-Sport, PCP-Sport, DAA-Sport, and ORG-Sport—were clearly identifiable. One item failed to load on any factor (i.e., Sport-MPS-2 item 25), one item cross-loaded on two factors (i.e., Sport-MPS-2 item 8), and two PCP-Sport items (i.e., Sport-MPS-2 items 27 and 31) unexpectedly loaded on the PS-Sport factor. In contrast, the simple structure and the interpretability of factors were more problematic in the seven- and eight-factor solutions.

In the seven-factor solution (see Table 6-2), three items failed to load on any factor (i.e., Sport-MPS-2 items 1, 25, and 29) and two items cross-loaded on two factors (i.e., Sport-MPS-2 items 34 and 42). Interpretation of the seventh factor was difficult because it contained two items designed to assess PS-Sport (Sport-MPS-2 items 18 and 34) and two items designed to assess PCP-Sport (Sport-MPS-2 items 27 and 31). Of the

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[1] The oblique six-factor solution had only one item (i.e., item 8) with a meaningful loading on two factors, while the orthogonal six-factor solution had two items (i.e., items 8 and 35) with meaningful loadings on two factors. Similarly, the oblique seven-factor solution had five items that either had meaningful loadings on two factors (i.e., items 34 and 42) or did not load onto any factor (i.e., items 1, 25, and 29), while the orthogonal seven-factor solution had six items that either had meaningful loadings on two factors (i.e., items 8, 34, 35, and 42) or did not load onto any factor (i.e., items 1 and 25). Finally, the oblique eight-factor solution had seven items that either had meaningful loadings on two factors (i.e., items 34, 35, and 42) or did not load onto any factor (i.e., items 1, 18, 25, and 29), while the orthogonal eight-factor solution had eight items that either had meaningful loadings on two or more factors (i.e., items 2, 8, 10, 18, 34, 35, and 42) or did not load onto any factor (i.e., item 29).

Table 6-1

Pattern Coefficients for Six-Factor Principal Axes Analysis of Sport-MPS-2 Data

Item #			Factor number					
A	B	Intended subscale	1	2	3	4	5	6
1.	1.	PS-Sport	.07	.03	-.03	**.34**	-.05	-.05
6.	8.	PS-Sport	**.43**	-.03	.02	**.33**	-.01	-.07
14.	18.	PS-Sport	.20	.11	-.17	**.37**	-.00	-.14
16.	22.	PS-Sport	.18	.05	.08	**.59**	-.11	-.03
19.	24.	PS-Sport	.19	-.00	.14	**.39**	-.06	-.02
28.	34.	PS-Sport	.02	.08	-.03	**.74**	-.06	.11
30.	37.	PS-Sport	.06	-.00	.12	**.60**	-.08	.04
2.	2.	COM-Sport	**.52**	-.01	.12	.08	.04	-.06
7.	10.	COM-Sport	**.62**	-.07	.16	-.05	.10	-.01
12.	16.	COM-Sport	**.51**	.03	.08	.02	.13	.11
21.	25.	COM-Sport	.24	.09	-.10	.14	.05	.04
24.	29.	COM-Sport	**.32**	-.03	.03	-.02	.14	.13
27.	33.	COM-Sport	**.59**	.04	.03	-.02	.18	.18
32.	40.	COM-Sport	**.63**	.01	.09	-.08	.15	.16
34.	43.	COM-Sport	**.48**	.02	-.01	.07	-.07	.13
3.	4.	PPP-Sport	-.16	.11	**.64**	.19	-.07	-.03
5.	7.	PPP-Sport	.09	.01	**.70**	-.11	.14	.13
8.	11.	PPP-Sport	.13	.02	**.76**	.00	-.05	.01
11.	15.	PPP-Sport	-.01	-.01	**.69**	-.17	.08	.04
15.	20.	PPP-Sport	.15	-.03	**.73**	-.06	.04	.04
22.	26.	PPP-Sport	.02	-.06	**.76**	-.12	-.00	.12
25.	30.	PPP-Sport	-.01	.04	**.70**	.09	-.01	-.18
31.	39.	PPP-Sport	.04	-.01	**.62**	-.00	.04	.05
33.	41.	PPP-Sport	.03	-.04	**.60**	.19	-.02	.02

Table 6-1 (Continued)

Item #			Factor number					
A	B	Intended subscale	1	2	3	4	5	6
4.	6.	PCP-Sport	.08	.07	.04	-.01	**.73**	-.01
10.	13.	PCP-Sport	.12	.02	.06	.13	**.54**	-.08
n/a	17.	PCP-Sport	.06	-.06	-.01	-.07	**.83**	-.00
17.	23.	PCP-Sport	-.01	-.03	.01	-.07	**.87**	.04
23.	27.	PCP-Sport	-.27	.07	.05	**.51**	.23	.02
26.	31.	PCP-Sport	-.10	-.06	-.05	**.44**	.24	.06
29.	36.	PCP-Sport	.08	.02	.01	-.04	**.62**	.07
n/a	3.	DAA-Sport	.09	-.10	.06	-.02	.09	**.45**
n/a	12.	DAA-Sport	.11	-.02	.01	.00	.05	**.44**
n/a	14.	DAA-Sport	-.05	.02	.08	-.00	.16	**.57**
n/a	21.	DAA-Sport	-.12	.08	.03	.10	-.01	**.69**
n/a	32.	DAA-Sport	.08	-.03	.02	.02	-.08	**.60**
n/a	38.	DAA-Sport	.09	-.01	-.08	-.02	-.09	**.61**
n/a	5.	ORG-Sport	.04	**.90**	-.01	-.10	-.05	.04
n/a	9.	ORG-Sport	.04	**.92**	.02	-.04	.01	.08
n/a	19.	ORG-Sport	.04	**.86**	.03	-.05	.01	-.00
n/a	28.	ORG-Sport	-.03	**.91**	-.08	-.11	.06	-.04
n/a	35.	ORG-Sport	.01	**.32**	.10	.29	.02	-.09
n/a	42.	ORG-Sport	-.11	**.35**	.08	.19	-.01	-.04

Note. Pattern coefficients ≥ | .30 | are in bold. A= Original Sport-MPS item number; B= Sport-MPS-2 item number. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

Table 6-2

Pattern Coefficients for Seven-Factor Principal Axes Analysis of Sport-MPS-2 Data

Item #			Factor number						
A	B	Intended subscale	1	2	3	4	5	6	7
1.	1.	PS-Sport	.09	.02	-.03	.24	.05	-.05	-.16
6.	8.	PS-Sport	**.46**	-.03	.02	.22	.03	-.08	-.12
14.	18.	PS-Sport	.29	.11	-.14	.13	.07	-.16	**-.31**
16.	22.	PS-Sport	.18	.01	.05	**.53**	.08	-.03	-.17
19.	24.	PS-Sport	.11	-.07	.09	**.55**	-.01	-.01	.07
28.	34.	PS-Sport	.07	.05	-.04	**.51**	.07	.11	**-.38**
30.	37.	PS-Sport	.00	-.07	.06	**.68**	.02	.06	-.10
2.	2.	COM-Sport	**.57**	.01	.14	-.02	-.01	-.07	-.05
7.	10.	COM-Sport	**.59**	-.07	.15	.04	-.12	-.01	.16
12.	16.	COM-Sport	**.54**	.05	.10	-.07	-.09	.11	-.04
21.	25.	COM-Sport	.25	.09	-.10	.09	-.04	.04	-.07
24.	29.	COM-Sport	.26	-.04	.01	.11	-.18	.13	.15
27.	33.	COM-Sport	**.60**	.06	.05	-.07	-.15	.17	.02
32.	40.	COM-Sport	**.62**	.03	.09	-.05	-.14	.16	.11
34.	43.	COM-Sport	**.47**	.02	-.00	.07	.06	.13	.05
3.	4.	PPP-Sport	-.13	.10	**.64**	.11	.10	-.04	-.16
5.	7.	PPP-Sport	.06	.01	**.70**	-.02	-.15	.13	.08
8.	11.	PPP-Sport	.11	.02	**.75**	.07	.05	.01	.06
11.	15.	PPP-Sport	.01	.01	**.71**	-.19	-.05	.04	-.00
15.	20.	PPP-Sport	.15	-.02	**.74**	-.05	-.02	.03	.02
22.	26.	PPP-Sport	-.02	-.06	**.75**	-.01	-.02	.12	.12
25.	30.	PPP-Sport	.02	.04	**.70**	.06	.04	-.18	-.07
31.	39.	PPP-Sport	.02	-.02	**.62**	.04	-.04	.05	.03
33.	41.	PPP-Sport	.04	-.04	**.60**	.15	.02	.02	-.09

Table 6-2 (Continued)

Item #			Factor number						
A	B	Intended subscale	1	2	3	4	5	6	7
4.	6.	PCP-Sport	.06	.06	.03	-.01	**-.73**	-.02	-.08
10.	13.	PCP-Sport	.15	.02	.07	-.01	**-.50**	-.08	-.21
n/a	17.	PCP-Sport	-.04	-.04	-.01	-.07	**-.87**	.04	-.07
17.	23.	PCP-Sport	.03	-.06	-.02	-.07	**-.83**	-.00	-.07
23.	27.	PCP-Sport	-.16	.08	.10	.05	-.12	.02	**-.71**
26.	31.	PCP-Sport	.01	-.05	-.01	.03	-.14	.06	**-.57**
29.	36.	PCP-Sport	-.02	-.01	-.04	.13	**-.69**	.07	.11
n/a	3.	DAA-Sport	.09	-.09	.06	-.05	-.09	**.45**	-.02
n/a	12.	DAA-Sport	.08	-.02	-.00	.04	-.07	**.44**	.05
n/a	14.	DAA-Sport	-.06	.01	.08	.00	-.17	**.57**	-.02
n/a	21.	DAA-Sport	-.09	.09	.05	-.02	.04	**.69**	-.16
n/a	32.	DAA-Sport	.05	-.04	.01	.05	.06	**.61**	.04
n/a	38.	DAA-Sport	.08	-.00	-.08	-.01	.08	**.61**	.03
n/a	5.	ORG-Sport	.06	**.89**	.01	-.04	.07	.02	.02
n/a	9.	ORG-Sport	.10	**.93**	.06	-.10	.04	.06	-.10
n/a	19.	ORG-Sport	.04	**.84**	.03	.05	-.01	-.01	.04
n/a	28.	ORG-Sport	-.02	**.88**	-.07	-.02	-.05	-.05	.04
n/a	35.	ORG-Sport	-.08	.26	.05	**.50**	-.10	-.08	.08
n/a	42.	ORG-Sport	-.20	**.30**	.03	**.43**	-.08	-.03	.13

Note. Pattern coefficients ≥ |.30| are in bold. A= Original Sport-MPS item number; B= Sport-MPS-2 item number. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

Table 6-3

Pattern Coefficients for Eight-Factor Principal Axes Analysis of Sport-MPS-2 Data

Item #			Factor number							
A	B	Intended subscale	1	2	3	4	5	6	7	8
1.	1.	PS-Sport	.10	.01	-.03	.26	.05	-.06	-.14	.04
6.	8.	PS-Sport	.21	.01	.01	**.35**	-.01	-.05	-.06	-.29
14.	18.	PS-Sport	.21	.12	-.14	.19	.06	-.16	-.28	-.12
16.	22.	PS-Sport	-.03	.06	.03	**.63**	.05	.00	-.13	-.16
19.	24.	PS-Sport	.02	-.04	.08	**.57**	-.03	.00	.08	-.00
28.	34.	PS-Sport	.09	.05	-.03	**.52**	.07	.10	**-.37**	.07
30.	37.	PS-Sport	-.10	-.03	.05	**.71**	-.00	.07	-.07	.01
2.	2.	COM-Sport	.22	.07	.12	.15	-.06	-.03	.03	**-.46**
7.	10.	COM-Sport	.24	-.01	.14	.19	-.17	.03	.24	**-.44**
12.	16.	COM-Sport	**.69**	-.02	.14	-.12	-.05	.05	-.06	.01
21.	25.	COM-Sport	.29	.07	-.09	.09	-.03	.02	-.07	.02
24.	29.	COM-Sport	.15	-.03	.01	.15	-.20	.14	.17	-.11
27.	33.	COM-Sport	**.56**	.04	.07	-.04	-.15	.15	.02	-.14
32.	40.	COM-Sport	**.75**	-.04	.14	-.10	-.10	.10	.09	.00
34.	43.	COM-Sport	**.38**	.01	.01	.12	.06	.12	.07	-.14
3.	4.	PPP-Sport	-.17	.12	**.63**	.12	.08	-.02	-.15	-.01
5.	7.	PPP-Sport	.02	.02	**.70**	-.02	-.16	.14	.08	-.04
8.	11.	PPP-Sport	.04	.03	**.75**	.09	.04	.01	.07	-.07
11.	15.	PPP-Sport	.01	.00	**.71**	-.19	-.05	.04	-.00	-.03
15.	20.	PPP-Sport	.01	.00	**.73**	.00	-.05	.05	.04	-.17
22.	26.	PPP-Sport	.01	-.07	**.76**	-.04	-.01	.11	.11	.04
25.	30.	PPP-Sport	-.03	.04	**.70**	.06	.03	-.18	-.07	-.03
31.	39.	PPP-Sport	.12	-.05	**.64**	-.01	-.02	.02	.00	.11
33.	41.	PPP-Sport	.12	-.07	**.61**	.12	.04	-.00	-.10	.10

Table 6-3 (Continued)

Item #			Factor number							
A	B	Intended subscale	1	2	3	4	5	6	7	8
4.	6.	PCP-Sport	-.03	.08	.02	.01	**-.75**	.00	-.06	-.07
10.	13.	PCP-Sport	.15	.02	.07	.00	**-.50**	-.09	-.20	-.02
n/a	17.	PCP-Sport	.01	-.05	.00	-.11	**-.86**	.04	-.08	.06
17.	23.	PCP-Sport	.08	-.07	-.02	-.11	**-.82**	-.01	-.08	.04
23.	27.	PCP-Sport	-.09	.08	.09	.07	-.12	.02	**-.69**	.03
26.	31.	PCP-Sport	.06	-.05	-.01	.05	-.14	.05	**-.57**	-.02
29.	36.	PCP-Sport	-.07	.00	-.05	.12	**-.71**	.08	.12	.01
n/a	3.	DAA-Sport	-.02	-.06	.05	.01	-.10	**.47**	.01	-.15
n/a	12.	DAA-Sport	.04	-.01	-.01	.06	-.08	**.45**	.06	-.05
n/a	14.	DAA-Sport	-.06	.03	.07	.00	-.18	**.58**	-.02	.00
n/a	21.	DAA-Sport	-.05	.09	.04	-.02	.04	**.69**	-.16	.03
n/a	32.	DAA-Sport	.12	-.05	.02	.04	.06	**.59**	.04	.07
n/a	38.	DAA-Sport	.14	-.02	-.07	-.03	.09	**.59**	.02	.03
n/a	5.	ORG-Sport	.02	**.90**	.01	-.06	.06	.03	.03	-.00
n/a	9.	ORG-Sport	.02	**.95**	.04	-.09	.03	.08	-.08	-.08
n/a	19.	ORG-Sport	-.00	**.84**	.03	.03	-.02	.00	.05	.02
n/a	28.	ORG-Sport	-.04	**.89**	-.08	-.06	-.06	-.04	.04	.04
n/a	35.	ORG-Sport	.07	.23	.07	**.43**	-.09	-.12	.08	**.32**
n/a	42.	ORG-Sport	.07	.23	.05	**.33**	-.06	-.08	.12	**.50**

Note. Pattern coefficients ≥ |.30| are in bold. A= Original Sport-MPS item number; B= Sport-MPS-2 item number. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

Table 6-4

Frequency of Problematic Items in the Six-, Seven-, and Eight-Factor Solutions According to Thurstone's (1947) Principle of Simple Structure

Factor Solution	Number of items without meaningful loadings on any factor	Number of items with meaningful loadings on two factors
Six-factor solution	1	1
Seven-factor solution	3	2
Eight-factor solution	4	3

Note. Loadings $\geq |.30|$ were deemed to be meaningful.

two PS-Sport items that loaded on this seventh factor, Sport-MPS-2 item 34 cross-loaded on a factor primarily comprised of PS-Sport items, and Sport-MPS-2 item 18 had pattern coefficients of .31 on the seventh factor and .29 on a factor comprised primarily of COM-Sport items.

In the eight-factor solution (see Table 6-3), four items did not have meaningful pattern coefficients on any factor (i.e., Sport-MPS-2 items 1, 8, 25, and 29) and three items cross-loaded on two factors (i.e., Sport-MPS-2 items 34, 35, and 42). As in the seven-factor solution, the seventh factor was difficult to interpret given that it was a three-item factor comprised of one PS-Sport item (i.e., Sport-MPS-2 item 34) and two PCP-Sport items (Sport-MPS-2 items 27 and 31). The PS-Sport item in this seventh factor again cross-loaded on a factor comprised primarily of PS-Sport items. The eighth factor was also plagued by interpretability problems given that it was a bipolar factor comprised of two COM-Sport items (i.e., Sport-MPS-2 items 2 and 10) and two ORG-Sport items (i.e., Sport-MPS-2 items 35 and 42). The two ORG-Sport items in this eighth factor also cross-loaded on a factor comprised primarily of PS-Sport items. Given the

problems associated with the simple structure and interpretability of the seven- and eight-factor solutions, the six-factor solution was retained. The six factors accounted for 51.77% of the total variance. The inter-factor correlations are presented in Table 6-5.

Table 6-5

Inter-Factor Correlations for the Oblique Six-Factor Principal Axes Solution

Factor	PS-Sport	COM-Sport	PPP-Sport	PCP-Sport	DAA-Sport	ORG-Sport
PS-Sport						
COM-Sport	.20					
PPP-Sport	.11	.20				
PCP-Sport	.07	.20	.18			
DAA-Sport	-.10	.28	.18	.30		
ORG-Sport	.32	.02	.04	-.01	-.15	

Note. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

As seen in Table 6-1, the newly developed DAA-Sport and ORG-Sport items formed clear and interpretable factors with all items loading on their intended factors. Indeed, all 12 items met Thurstone's (1947) criteria for simple structure, with pattern coefficients > $|.30|$ on the intended factor and pattern coefficients < $|.30|$ on all other factors. As indicated earlier, the factor structure and factorial composition of the remaining four factors corresponded to the four-factor solutions produced in previous examinations of the latent dimensionality of the original Sport-MPS by Dunn and

colleagues (i.e., Dunn et al., 2006; Dunn et al., 2002). That is, the remaining four factors resembled the anticipated *Personal Standards*, *Perceived Parental Pressure*, *Concern Over Mistakes*, and *Perceived Coach Pressure* subscales.

As noted previously, four items from the original Sport-MPS displayed unexpected loadings in the present six-factor solution (see Table 6-1). Item 8 ("I hate being less than the best at things in my sport") was originally developed by Dunn et al. (2002) to measure personal standards. However, as seen in Table 6-1, this item loaded on both the PS factor and on the COM factor (pattern coefficients of .33 and .43 respectively). Additionally, one item that was intended to measure COM (i.e., Sport-MPS-2 item 25: "I should be upset if I make a mistake in competition") did not have a meaningful loading (i.e., $>|.30|$) on any factor, although it should be recognized that the item's largest pattern coefficient (.24) was on the COM factor.

The new Sport-MPS-2 item introduced in this study to measure perceived coach pressure (i.e., item 17: "I feel like I can never quite meet my coach's expectations") had a pattern coefficient of .83 on the PCP-Sport factor (see Table 6-1) and demonstrated excellent simple structure. However, item 27 ("My coach sets very high standards for me in competition") and item 31 ("My coach expects excellence from me at all times: both in training and competition") did not load on the PCP-Sport factor as anticipated (pattern coefficients of .23 and .24 respectively), but had meaningful loadings on the PS-Sport factor (pattern coefficients of .51 and .44 respectively).

To examine the degree to which these unexpected factor loadings might influence the manner in which researchers conceptualize the latent structure of the Sport-MPS-2, factor scores for each athlete in this study were computed for the PS, COM, and PCP

factors based on (a) the current factor structure as shown in Table 6-1, and (b) the anticipated factor structure (based on Dunn and colleagues' research [i.e., Dunn et al., 2006; Dunn et al., 2002] research).[2] Bivariate correlations were then calculated between the participants' factor scores on these factors according to the factor structures of the two solutions. Unique unit-weighting was used to calculate all factor scores (as recommended by Morris, 1979). The correlation between the PS-Sport factor scores was .93, the correlation between the COM-Sport factor scores was .97, and the correlation between the PCP-Sport factor scores was .96.[3]

The magnitude of these correlations indicates that irrespective of whether the subscale scores computed for PS-Sport, COM-Sport, and PCP-Sport are based on the current factor structure (see Table 6-1) or the factor structure proposed for these subscales by Dunn and colleagues' (Dunn et al., 2006; Dunn et al., 2002), there is a very high degree of shared variance between the composite subscale scores in the respective solutions. Given that (a) fluctuations in factor loadings at the item-level are often caused by idiosyncratic features of different samples (Fabrigar et al., 1999), and (b) the labeling and interpretation of the PS-Sport, COM-Sport, and PCP-Sport factors would remain the same in this study (irrespective of the changes in factor loadings observed on Sport-MPS-2 items 8, 25, 27, and 31), a decision was made to adopt the original item composition of the PS-Sport, COM-Sport, and PCP-Sport subscales proposed by Dunn and colleagues. The proposed item composition of the six Sport-MPS-2 subscales along with their mean item scores, standard deviations, and internal consistencies are presented in Table 6-6.

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[2] Factor scores were not computed for PPP-Sport because the current PPP-Sport factor structure corresponded directly with the anticipated factor structure.

[3] This item-set includes the new item designed to assess PCP-Sport (i.e., Sport-MPS-2 item 17) that was introduced in this study.

All of the Sport-MPS-2 subscales demonstrated adequate levels of internal consistency (i.e., all coefficient alphas ≥ .74).

Table 6-6

Sport-MPS-2 Subscale Means, Standard Deviations, and Internal Consistencies (α)

Subscale	Subscale item numbers	*M*	*SD*	α
PS	1, 8, 18, 22, 24, 34, 37	3.68	0.52	.74
COM	2, 10, 16, 25, 29, 33, 40, 43	2.87	0.68	.79
PPP	4, 7, 11, 15, 20, 26, 30, 39, 41	2.11	0.71	.89
PCP	6, 13, 17, 23, 27, 31, 36	3.30	0.64	.75
DAA	3, 12, 14, 21, 32, 38	2.40	0.59	.75
ORG	5, 9, 19, 28, 35, 42	3.56	0.72	.87

Note. PS = Personal standards; COM = Concern over mistakes; PPP = Perceived parental pressure; PCP = Perceived coach pressure; DAA = Doubts about actions; ORG = Organization.

Discussion

The primary purpose of this chapter was to determine if the new DAA-Sport and ORG-Sport items would form identifiable and unique factors when examined in conjunction with the 30 items of the original Sport-MPS. As indicated in Table 6-1, all of the DAA-Sport and ORG-Sport items had meaningful loadings on their respective factors and negligible loadings on all other factors. This pattern of simple-structure provides evidence that the new DAA-Sport and ORG-Sport items represent unique constructs within the Sport-MPS-2 and supports the retention of six factors that underlie the latent structure of the instrument. This result also corroborates some of the multidimensional

scaling results presented in Chapter 5 (see Tables 5-5 and 5-6 and Figures 5-2 and 5-3). Thus, the present factor analytic results provide support (at the structural level) for the inclusion of the DAA-Sport and ORG-Sport items in the Sport-MPS-2.

There is one important difference between the multidimensional scaling (MDS) results from Chapter 5 and the present factor analytic results. Specifically, the first MDS analysis conducted in Chapter 5 (see Table 5-4 and Figure 5-1) suggested the possibility that the DAA-Sport and ORG-Sport item sets may each contain two underlying latent dimensions. However, the six-factor solution produced in this study (see Table 6-1) indicates that DAA-Sport and ORG-Sport are best conceptualized as unidimensional constructs. Davison (1983) reports that EFA and MDS results may differ due to idiosyncratic features inherent in independent samples or as a result of systematic methods variance inherent in the techniques. Therefore, while the present results support the unidimensionality of both DAA-Sport and ORG-Sport, researchers should continue to examine the latent dimensionality of these subscales. These issues reinforce the need for multi-method multi-analytical designs in the investigation of the latent dimensionality of constructs (see Campbell & Fiske, 1959) and for the ongoing nature of the construct validation process (Messick, 1989).

Despite the apparent support for six-factors to represent the latent dimensionality of the Sport-MPS-2, it must still be acknowledged that the confirmatory factor analytic (CFA) results did not support this model. As noted by Dunn et al. (2006), it is not uncommon for CFA procedures to reject models that are supported by EFA procedures. Dunn et al. cited the work of Van Prooijen and Van Der Kloot (2001) who used CFA procedures to test models from 10 independent data sets that had been reported in the

literature as having adequate EFA solutions. In these CFAs, each item was allowed to only load on one latent variable (similar to the CFA procedures utilized in this study). Van Prooijen and Van Der Kloot indicated that their CFAs only supported 3 of the 10 EFA-based models and reported that such results may have been obtained because CFA techniques often employ overly stringent model criteria that make it difficult to support models produced through EFA. Regardless of why the current CFA did not support a six-factor model for the Sport-MPS-2 data, it is important to note Gorsuch's (2003) position on the use of EFA as a powerful construct validation procedure. Specifically, Gorsuch argued that the repeated verification of a factor solution through multiple EFA investigations with independent samples is the most powerful method of factor validation. As a result, further examination of the factor structure of the instrument using both CFA and EFA procedures across multiple independent samples is advocated.

It should be emphasized that the general factorial composition and factor structure of the original Sport-MPS subscales (i.e., PS, COM, PPP, and PCP) produced in the present six-factor Sport-MPS-2 EFA solution (see Table 6-1) was similar to the factorial composition and factor structure of these subscales as proposed by Dunn and colleagues (Dunn et al., 2006; Dunn et al., 2002). However, some unexpected results were obtained in the present study with respect to the factor structures of the PS, COM, and PCP subscales. For example, Sport-MPS-2 items 27 and 31 ("My coach sets very high standards for me in competition" and "My coach expects excellence from me at all times: both in training and competition" [original Sport-MPS items 23 and 26 respectively]) did not have meaningful loadings on the intended PCP factor (see Table 6-1). Instead, both of these items loaded on the PS factor. Interestingly, Dunn et al. (2006) also reported that

item 27 had a cross-loading on the PS-Sport factor following exploratory factor analyses of Canadian football players (pattern coefficient = .37) and youth ice hockey players (pattern coefficient = .33), although these pattern coefficients were less than the respective loadings on the PCP factors for both the football players (pattern coefficient = .40) and hockey players (pattern coefficient = .54). Similarly, item 31 had cross-loaded on the PS factor in Dunn et al.'s (2006) analysis of Canadian football players (pattern coefficient = .39), but again this item loaded more strongly on the PCP factor (pattern coefficient = .46). It is possible that these two items are not factorially pure and may tap into the perceived coach pressure dimension and the personal standards dimension.

In contrast to the potential factor structure issues surrounding items 27 and 31, the new item included in the Sport-MPS-2 to measure PCP-Sport (i.e., item 17: "I feel like I can never quite meet my coach's expectations") had a strong loading (pattern coefficient = .83) on the PCP factor (see Table 6-1) and had negligible loadings on all other factors. As a result, it appears that this item is suitable to be added to the instrument. It is recommended that future research continue to examine the psychometric and structural consequences of including or excluding items 17, 27, and 31 from the PCP subscale of the Sport-MPS-2.

In the present study, Sport-MPS-2 item 8 ("I hate being less than the best at things in my sport" [original Sport-MPS item 6]) had a meaningful loading on both its intended factor (i.e., PS-Sport) as well as on the concern over mistakes factor. Additionally, Sport-MPS-2 item 25 ("I should be upset if I make a mistake in competition" [original Sport-MPS item 21]) was designed to measure concern over mistakes, but did not have a meaningful loading on any of the factors produced in the present solution. Interestingly,

both of these items demonstrated adequate simple structure (i.e., pattern coefficients $>|.30|$ on their intended factor and pattern coefficients $<|.30|$ on all other factors) across the four independent EFA solutions that were reported by Dunn and colleagues (Dunn et al., 2006; Dunn et al., 2002) in their examinations of the latent structure of the original Sport-MPS. It is also worth noting that a number of original Sport-MPS items that did not always display adequate simple structure in Dunn and colleagues' factor analytic studies did display adequate simple structure in the present study (i.e., Sport-MPS-2 items 2, 4, 23, 30, and 36). To explain such findings, Fabrigar et al. (1999) argued that due to sampling error, different samples will often bring unique sets of idiosyncratic characteristics to independent EFA analyses of identical variables. As a result, the differences in the factor structures of the PS-Sport, COM-Sport, and PCP-Sport factors in the present study versus those reported by Dunn and colleagues' in their analyses of the original Sport-MPS may, in part, be due to the idiosyncratic features of the samples (Dunn et al., 2006; Fabrigar et al., 1999). Moreover, the high correlations between the factor scores that were calculated in this study between the item content of the PS (r = .93), COM (r = .97), and PCP (r = .96) subscales (as indicated by the factor structures) suggest that these item content differences have a negligible impact on the functionality and interpretation of the subscales.

In summary, the present study's factor analytic investigation of the Sport-MPS-2 indicates that the instrument is best represented by six factors that correspond to the four original Sport-MPS subscales (as proposed by Dunn and colleagues [Dunn et al., 2006; Dunn et al., 2002]) and the two new DAA-Sport and ORG-Sport subscales. Researchers who utilize the Sport-MPS-2 should recognize that while the general factorial

composition and factor structure of the Sport-MPS-2 appears to be quite robust, minor differences at the item level of the factor structures of the instrument's subscales may exist across independent samples due to idiosyncratic sample characteristics. Although more research is required before the internal structure (or latent dimensionality) of the Sport-MPS-2 can be accepted with more confidence, it seems appropriate to continue the construct validation process by examining the extent to which the Sport-MPS-2 subscales have meaningful relationships with other constructs. In other words, external validity evidence is required to support the use of the Sport-MPS-2 as a measure of perfectionism in sport (cf. Messick, 1989).

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Chapter 7

Establishing External Validity Evidence for the Sport-MPS-2

The previous chapters were designed to provide initial internal validity evidence for a revised version of Dunn, Causgrove Dunn, and Syrotuik's (2002) *Sport Multidimensional Perfectionism Scale*, that has been re-named, the *Sport Multidimensional Perfectionism Scale 2* (Sport-MPS-2). Although establishing this type of validity evidence is a critical component of the construct validation process, it does not provide test users with a sufficient basis upon which to justify inferences and actions that are based on test scores (Messick, 1989). In reference to Messick's unified validity framework, it is also necessary to provide external validity evidence for test scores. The current chapter describes a study that attempts to establish such evidence for assessments produced by the Sport-MPS-2.

Messick's external component of validity "refers to the extent to which [a] test's relationships with other tests and nontest behaviors reflect the high, low, and interactive relations implied in the theory of the construct being assessed" (1989, p. 45). One method of externally validating a test's scores is to examine the relationships between these scores and the scores obtained by other instruments designed to measure similar constructs. The Sport-MPS subscales are grounded upon the subscales of Frost, Marten, Lahart, and Rosenblate's *Multidimensional Perfectionism Scale* (Frost-MPS: 1990). Therefore, both instruments conceptualize perfectionism in analogous ways (cf. Dunn et al., 2002; Frost et al.). Both the Sport-MPS-2 and the Frost-MPS contain subscales that assess personal standards (PS-Sport and PS-Frost, respectively), organization (ORG-Sport and ORG-Frost, respectively), concern over mistakes (COM-Sport and COM-Frost,

respectively), and doubts about actions (DAA-Sport and DAA-Frost, respectively). In fact, according to each instrument's proposed factor composition (cf. Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Frost et al.; Chapter 6 of this dissertation), the major differences in the underlying dimensionality of the two instruments are reflected in the measurement of interpersonal aspects of perfectionism. Specifically, the Frost-MPS differentiates between parental criticism (PC-Frost) and parental expectations (PE-Frost) whereas the Sport-MPS-2 combines these subscales into a single dimension that is labelled, *perceived parental pressure* (PPP-Sport). Furthermore, the Sport-MPS-2 contains a subscale that assesses perceived coach pressure (PCP-Sport) while the Frost-MPS does not assess this dimension at all (see Dunn et al., 2002). The reader is referred to Chapters 1 and 6 of the dissertation for a detailed description of the perfectionism dimensions represented by the subscales of the Frost-MPS and Sport-MPS-2.

Another key difference between the Frost-MPS and Sport-MPS-2 is the situational or contextual frames of reference that respondents are asked to consider when completing the instruments. The Frost-MPS assesses perfectionism as a global personality trait (Flett & Hewit, 2002). That is, the Frost-MPS measures perfectionism levels that are proposed to be pervasive across different life domains. In accordance with this conceptualization, the instrument makes very little reference to specific situational contexts in which the trait may be operating. In contrast, the Sport-MPS-2 assesses perfectionism in a specific situational context (i.e., sport). Accordingly, the items that comprise the Sport-MPS-2 are contextually relevant to the sport domain.

Given that the Frost-MPS provides global perfectionism assessments that are similar in structure to the domain-specific perfectionism assessments produced by the

Sport-MPS-2, it follows that Frost-MPS assessments would serve as adequate criteria upon which to evaluate the external validity of Sport-MPS-2 assessments. This claim is strengthened by the fact that the Frost-MPS has been used more than any other instrument to assess perfectionist orientations within sport psychology research (see Coen & Ogles, 1993, Frost & Henderson, 1990; Gotwals, Dunn, & Wayment, 2003; Gould, Dieffenbach, & Moffet, 2002; Gould, Udry, Tuffey, & Loehr, 1996; Hall, Kerr, & Matthews, 1998; Koivula, Hassmén, & Falby, 2002). Therefore, the present study attempted to establish external validity evidence for the Sport-MPS-2 by using both correlational and factor analytical techniques to examine relationships between the Sport-MPS-2 and Frost-MPS subscales. It was hypothesized that there would be strong positive correlations between conceptually analogous subscales of the two instruments (i.e., PS-Sport and PS-Frost; ORG-Sport and ORG-Frost; COM-Sport and COM-Frost; DAA-Sport and DAA-Frost; PPP-Sport and PC-Frost; and PPP-Sport and PE-Frost). No specific hypotheses were offered regarding the relationship between the PCP-Sport subscale of the Sport-MPS-2 and the Frost-MPS subscales given that there is not a subscale in the Frost-MPS that specifically assesses this construct.

The subscales of the Frost-MPS are proposed to represent unique components of perfectionism. However, studies that have (a) conducted subsequent second-order factor analyses of the Frost-MPS (e.g., Cox, Enns, & Clara, 2002; Stumpf & Parker, 2000) or (b) examined the relationship between the Frost-MPS and other perfectionism instruments (e.g., Bieling, Israeli, & Antony, 2004; Frost, Hemiburg, Holt, Mattia, & Neubauer, 1993; Slaney, Ashby, & Trippi, 1995) have indicated that two higher-order factors may underlie these dimensions. In general, one of these second order factors

contains the COM-Frost, DAA-Frost, PE-Frost, and PC-Frost subscales. A consistent theme reflected across these subscales is the tendency to be overly concerned about whether personal performances will be judged poorly by significant others. As a result, the factor has been labelled *Maladaptive Evaluation Concerns* (Frost et al., 1993). The second higher-order factor generally contains the PS-Frost and ORG-Frost subscales. These subscales reflect a tendency to strive for very high standards of order, organization, and personal performance. Accordingly, this factor is generally labelled *Positive Striving* (Frost et al., 1993). Given the similarities between the dimensions of the Frost-MPS and the Sport-MPS-2, it seems reasonable to speculate that a subscale-level factor analytic examination of these two instruments will identify factors similar to the maladaptive evaluation concerns and positive striving factors that previous studies have found.

Messick (1989) indicated that in addition to investigating the relationships between different measures of similar constructs, the assessments produced by an instrument can also be externally validated by examining the degree to which its assessments relate in theoretically meaningful ways to those produced by measures of different constructs. Therefore, in order to obtain additional external validity evidence for the Sport-MPS-2, the proposed study examined relationships between perfectionism (as measured by the Sport-MPS-2) and competitive trait anxiety.

Competitive trait anxiety (CTA) can be defined as "an individual's tendency to perceive competitive situations as threatening and to respond to these situations with [state anxiety]" (Martens, Vealey, & Burton, 1990, p. 11). Competitive trait anxiety is considered to be multidimensional in nature with both cognitive and somatic components (Smith, Smoll, & Schutz, 1990; Smith, Smoll, & Wiechman, 1998). The somatic

component of CTA reflects athletes' perceived physiological responses to threats including increased muscle tension, "butterflies in the stomach," and shortness of breath. The cognitive component of CTA reflects the degree to which athletes typically experience worry, self-doubt, and negative self-appraisals when confronted with threats in the competitive sport domain.

Smith et al. (1998) argue that the two most salient sources of threat in the competitive sport environment reflect anticipated personal performance failure and negative social evaluation (conceptualized as "disapproval by significant others who are evaluating the athlete's performance in relation to some standard of excellence" [p. 107]). This claim has been substantiated by numerous studies with athletes (e.g., Dunn, 1999; Gould, Horn, & Spreeman, 1983; James & Collins, 1997; Wilson & Eklund, 1998). For example, Dunn indicated that male intercollegiate ice hockey players ($N = 178$) were more likely to worry about threats relating to performance failure and negative social evaluation than threats relating to physical injury and situational uncertainty. Numerous studies have also found that athletes who have high levels of CTA tend to worry more frequently about performance failure and negative social evaluation than athletes who have low levels of CTA (e.g., Brustad, 1988; Brustad & Weiss, 1987; Gould et al., 1983; Passer, 1983; Rainey & Cunningham, 1988).

As indicated in Chapter 1, maladaptive perfectionists are also overly sensitive to threats relating to negative social evaluation and performance failure (Burns, 1980; Hamachek, 1978; Hewitt & Flett, 1991). For example, Hamachek (1978) argued that a core component of both maladaptive and adaptive perfectionism is reflected by an individual's tendency to demand the attainment of a perfect (i.e., flawless) performance.

However, maladaptive perfectionists often feel burdened by these unrealistic standards because they perceive that they are imposed by significant others who are overly critical of the maladaptive perfectionists' efforts to achieve these standards (Hewitt & Flett, 1991). Blatt also indicated that maladaptive perfectionistic individuals have "powerful needs… to avoid possible public criticism" (1995, p. 1005) because their perceptions of self-worth are intricately tied to the achievement of their self- or other-imposed standards. As such, maladaptive perfectionists tend to focus, on and be overly concerned about, personal mistakes committed in performance contexts (Blatt). Indeed, because perfect performance is so rarely achieved, Burns suggested that perfectionists develop a fear that their perceived performance failures will occur time and time again.

Unlike maladaptive perfectionists, though, adaptive perfectionists allow themselves some freedom to commit mistakes in performance environments (Hamachek, 1978). As a result, adaptive perfectionists do not equate personally committed mistakes with failure to the same degree as maladaptive perfectionists. Hamachek also proposed that adaptive perfectionists are not as sensitive to the expectations and criticisms of significant others as maladaptive perfectionists because their main source of satisfaction and enjoyment comes from the effort that they put towards achieving perfect performance.

This review of CTA theory and Hamachek's (1978) theoretical overview of perfectionism reveals conceptual similarities between the two constructs. Both maladaptive perfectionists and high CTA individuals display enhanced sensitivity towards threats in achievement settings that relate to the possibility of performance failure and negative social evaluation. In contrast, both adaptive perfectionists and low

CTA individuals are not as sensitive to these same threats in achievement situations. Therefore, according to theory, there should be strong ties between maladaptive perfectionism and high CTA, and between adaptive perfectionism and low CTA.

A considerable amount of research has identified links between higher levels of global perfectionism and higher levels of context-specific trait anxiety in the general psychology literature (for a review, see Frost & DiBartolo, 2002). For example, heightened levels of perfectionism have been associated with higher levels of trait anxiety in the performing arts (Mor, Day, & Flett, 1995), academic test settings (Mills & Blankstein, 2000), and university statistics classes (Onwuegbuzie & Daley, 1999). Although not measuring trait anxiety, Hall et al. (1998) examined the relationship between global levels of perfectionism and competitive *state* anxiety among male and female high-school cross-country runners (n = 119). Athletes completed the Frost-MPS one week before a cross-country meet and then completed a measure of competitive state anxiety 1 week, 2 days, 1 day, and 30 minutes prior to the race. Maladaptive components of perfectionism (i.e., COM-Frost, DAA-Frost, and PC-Frost) were consistently linked with heightened cognitive state anxiety at each time interval leading up to the race.

Only one study (i.e., Frost & Henderson, 1991) has specifically examined the relationship between perfectionism and CTA in sport. Frost and Henderson gave the Frost-MPS and the *Sport Competition Anxiety Test* (SCAT: Martens, 1977)—a measure of CTA—to a sample of 40 female intercollegiate athletes from a variety of team and individual sports. Similar to Hall et al.'s (1998) findings, analysis of the participants' responses revealed significant positive correlations between COM-Frost and the SCAT (r = .47) and between a composite perfectionism score and the SCAT (r = .38). Given that

the COM-Frost subscale is considered to represent a maladaptive component of perfectionism (Frost et al., 1993), the correlation between this subscale and the SCAT provides support for the proposed link between maladaptive perfectionism and high levels of CTA. However, more theoretically meaningful results may have been obtained had Frost and Henderson chosen an alternative method of examining their participants' responses to the Frost-MPS.

Messick (1989) indicated that the latent structure of an instrument should reflect the structure of the construct that the instrument is designed to assess and that "every effort should be made to capture this structure at the level of test scoring and interpretation" (1989, p. 44). Messick recommended that, if possible, a profile of scores should be considered in the interpretation of assessments of multidimensional constructs with each score in the profile representing a component of the construct. The Frost-MPS measures perfectionism as a multidimensional construct which is mirrored in the instrument's latent structure (see Cheng, Chong, & Wong, 1999; Cox et al., 2002; Harvey, Pallant, & Harvey, 2004; Khawaja & Armstrong, 2005; Purdon, Antony, & Swinson, 1999; Stöber, 1998, Stumpf & Parker, 2000). Therefore, it follows that an appropriate method of interpreting Frost-MPS assessments would be to consider profiles or patterns of scores across the instrument's subscales (see Dunn, Causgrove Dunn, et al., 2006; Dunn, Gotwals, Causgrove Dunn, & Syrotuik, 2006; Gotwals et al., 2003; Parker, 1997; Rice & Mirzadeh, 2000).

Parker (1997) utilized this type of approach in the interpretation of Frost-MPS assessments and demonstrated that it served to highlight theoretically meaningful differences between maladaptive and adaptive profiles of perfectionism. Specifically,

Parker utilized a cluster analytic protocol to classify academically-talented male and female Grade 6 students (n = 820) into groups based on their profile of scores across the six Frost-MPS subscales. These groups were labeled as dysfunctional perfectionists, healthy perfectionists, and non-perfectionists. The dysfunctional perfectionists (i.e., maladaptive perfectionists) were characterized by relatively high scores across all six Frost-MPS subscales while the healthy perfectionists (i.e., adaptive perfectionists) were characterized by relatively high scores on PS-Frost and ORG-Frost subscales and low scores on the COM-Frost, DAA-Frost, PE-Frost, and PC-Frost subscales. The non-perfectionists were characterized by relatively low scores across all Frost-MPS subscales. A descriptive comparison of these three groups revealed that the healthy perfectionists were "the least neurotic, the most extroverted, the most agreeable, and the most conscientious" (Parker, p. 555). In contrast, the dysfunctional perfectionists were "socially detached, defensive, anxious, and moody" (p. 556).

These profiles of dysfunctional and healthy perfectionists are directly in line with Hamachek's (1978) conceptualization of maladaptive and adaptive perfectionism. Since Parker (1997) employed this cluster analytic protocol, numerous other perfectionism researchers have adopted this analytic approach to examine perfectionism profiles (e.g., Dixon, Lapsley, & Hanchon, 2004; Rice, Bair, Castro, Cohen, & Hood, 2003; Rice & Dellwo, 2002; Rice & Lapsley, 2001; Rice & Mirzadeh, 2000). Each of these studies has identified maladaptive and adaptive perfectionism profiles that are similar to those reported by Parker. Collectively, these studies have shown that maladaptive perfectionists report higher levels of depression (Rice & Dellwo; Rice & Mirzadeh) and more frequently employ dysfunctional coping styles (Rice & Lapsley) than adaptive

perfectionists. These studies have also shown that adaptive perfectionists tend to report higher levels of achievement effort satisfaction (Rice & Mirzadeh) and self-esteem (Rice & Dellwo) than maladaptive perfectionists.

The aforementioned profiling studies provide evidence that Parker's (1997) cluster analytic protocol is a useful method of identifying groups of maladaptive and adaptive perfectionists based upon scores obtained from multidimensional perfectionism instruments. Given that the Frost-MPS served as the conceptual framework for developing the Sport-MPS-2, it seems reasonable to speculate that Parker's protocol may also be useful in identifying clusters of maladaptive and adaptive perfectionists using Sport-MPS-2 data. To this end, the present study utilized Parker's protocol to determine if athletes with different perfectionist profiles (as measured by the Sport-MPS-2) differed in theoretically expected ways in terms of their competitive trait anxiety levels. It was hypothesized that this cluster analytic procedure would identify a group of maladaptive perfectionists (as reflected by high scores across the six subscales of the Sport-MPS-2) who would have higher CTA levels than a group of adaptive perfectionists (as reflected by high PS-Sport and ORG-Sport subscale scores and low COM-Sport, DAA-Sport, PPP-Sport, and COM-Sport subscale scores).

In summary, the purposes of the present phase of the construct validation process were to establish external validity evidence for Sport-MPS-2 assessments through examination of relationships between perfectionism levels in sport (as assessed by the Sport-MPS-2) and two external criterion constructs: namely, global perfectionism (as assessed by the Frost-MPS) and CTA. In accordance with Messick's (1989) validity framework, such an examination will not only advance the construct validation process

surrounding the Sport-MPS-2, but will also serve to further clarify and strengthen perfectionism theory.

Method

Participants

Participants were 181 male intercollegiate varsity ice hockey players from eight different Canadian colleges and universities. The student-athletes ranged in age from 18.0 to 31.75 years (*M* age = 22.36 years, *SD* = 1.91). All participants were pursuing undergraduate academic degrees with the exception of eight athletes who were working towards a second undergraduate degree/diploma.

Measures

Participants completed four self-report instruments: a demographic questionnaire, the Sport-MPS-2, the Frost-MPS, and a modified version of the Sport Anxiety Scale (SAS: Smith et al., 1990). The demographic questionnaire asked participants to respond to questions regarding their age, post-secondary education, and intercollegiate athletic experience (e.g., playing experience and playing position).

Sport Multidimensional Perfectionism Scale 2. The Sport-MPS-2 (see Appendix G for Sport-MPS-2 item numbers and verbatim item descriptions) was used to measure perfectionism within the domain of sport. The instrument contains 43 items designed to assess the perfectionism dimensions of *Personal Standards* (PS-Sport: 7 items), *Concern Over Mistakes* (COM-Sport: 8 items), *Perceived Parental Pressure* (PPP-Sport: 9 items), *Perceived Coach Pressure* (COM-Sport: 7 items), *Doubts About Actions* (DAA-Sport: 6 items), and *Organization* (ORG-Sport: 6 items). Instructions inform respondents that the purpose of the questionnaire is to determine how athletes "view certain aspects of their

competitive experiences in sport." Respondents rate the extent to which they agree with each of the items using a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Higher composite subscale scores reflect higher levels of perfectionism on each respective dimension.

The previous phases of this dissertation produced validity and reliability evidence supporting the use of the Sport-MPS-2 as a measure of perfectionism in sport. For example, Chapters 2, 3, and 4 established content-related validity evidence for the DAA-Sport and ORG-Sport subscales of the Sport-MPS-2. Additionally, Dunn and colleagues (Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Dunn, Gotwals, et al., 2006) produced external validity evidence in support of the PS-Sport, COM-Sport, PPP-Sport, and COM-Sport subscales by demonstrating that each subscale had theoretically meaningful relationships with global perfectionism—as assessed by Hewitt and Flett's (1991) *Multidimensional Perfectionism Scale* (Dunn, Causgrove Dunn et al., 2006)—competitive anger (Dunn, Gotwals et al., 2006; Vallance, Dunn, & Causgrove Dunn, in press), and achievement goal orientations (Dunn et al., 2002). To date, the four original subscales of the Sport-MPS have demonstrated acceptable levels of internal consistency (i.e., Cronbach's alphas [αs] $\geq$ .70: see Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Dunn, Gotwals, et al., 2006; Vallance et al., in press) as have the new DAA-Sport and ORG-Sport subscales that have been added to the Sport-MPS-2 (see Chapter 6).

Results from a recent study conducted by Dunn, Gamache, and Causgrove Dunn (2006) from the same sport perfectionism research program on perfectionism at the University of Alberta within which the current dissertation is embedded also indicated that the Sport-MPS-2 is best represented by six factors. Specifically, Dunn, Gamache, et

al. conducted a principal axes factor analysis on Sport-MPS-2 data provided by 126 male and 137 female intercollegiate varsity volleyball players (*M* age = 20.02 years; *SD* = 1.66). Following a direct oblimin transformation (delta = 0), the anticipated factors—namely, PS, COM, PCP, PPP, DAA, and ORG—were clearly evident in a six-factor solution. Forty of the 43 items demonstrated adequate simple structure (i.e., pattern coefficients $\geq |.30|$ on only one factor) and had their primary loading on the anticipated factor. Of the three remaining items, two failed to have meaningful loadings on any factor (i.e., item 1: "If I do not set the highest standards for myself in my sport, I am likely to end up a second-rate player", and item 2: "Even if I fail slightly in competition, for me, it is as bad as being a complete failure"), and one PCP item (i.e., item 36: "I feel like my coach never tries to fully understand the mistakes I sometimes make") loaded on an unexpected factor (i.e., the DAA factor). Overall, the observed factor structure reported by Dunn, Gamache, et al. further reinforces the likelihood that minor deviations to the factor structure of Sport-MPS-2 subscales at the item level are likely to occur across independent samples (see Chapter 6; Dunn, Causgrove Dunn, et al., 2006; Fabrigar, Wegener, MacCallum, & Strahan, 1999) and that the factorial composition of the instrument is quite robust across samples of intercollegiate level athletes.[1] Nevertheless, the latent dimensionality of the Sport-MPS-2 was again examined in this study to investigate this claim.

Multidimensional Perfectionism Scale. Frost et al.'s (1990) Multidimensional Perfectionism Scale (Frost-MPS: see Appendix H) was used to assess global levels of perfectionism. The instrument contains 35 items that are intended to measure *Personal*

[1] A copy of the pattern matrix obtained by Dunn, Gamache, et al. (2006) is available upon request from Dr. John Dunn at the University of Alberta (personal communication, May 23, 2006)

Standards (PS-Frost: 7 items), *Concern Over Mistakes* (COM-Frost: 9 items), *Doubts About Actions* (DAA-Frost: 4 items), *Parental Criticism* (PC-Frost: 4 items), *Parental Expectations* (PE-Frost: 5 items), and *Organization* (ORG-Frost: 6 items). Instructions inform respondents that the purpose of the instrument is to "understand how people view a variety of their experiences in life". Respondents indicate their level of agreement to each Frost-MPS item on a 5-point scale (1 = *strongly disagree*; 5 = *strongly agree*). Higher composite scores on each subscale represent higher perfectionism levels on each respective dimension.

Enns and Cox (2002) reviewed the vast body of literature that has utilized the Frost-MPS and stated that there is compelling evidence of the "construct, concurrent, and discriminant validity" (p. 42) of the assessments provided by the instrument. For instance, the Frost-MPS subscales have been shown to relate in meaningful ways to other perfectionism measures including Hewitt and Flett's (1991) *Multidimensional Perfectionism Scale* (see Frost et al., 1993), Burns's (1980) perfectionism scale (see Frost et al., 1990), and Johnson and Slaney's (1996) *Almost Perfect Scale* (see Slaney et al., 1995). In their initial development of the Frost-MPS, Frost et al. (1990) indicated that each of the instrument's subscales possessed acceptable levels of internal consistency (Cronbach's alpha ranged from .77 to .93). Studies conducted with athletes by Gotwals et al. (2003) and Gould et al. (1996) have also reported acceptable levels of internal consistency for the six subscales.

As indicated in Chapter1, a number of studies (e.g., Cheng et al., 1999; Cox et al., 2002; Harvey et al., 2004; Khawaja & Armstrong, 2005; Purdon et al., 1999; Stöber, 1998; Stumpf & Parker, 2000) have indicated that the factorial composition and factor

structure of the Frost-MPS may not match the original dimensionality proposed by Frost et al. (1990). The results of these studies have suggested that the Frost-MPS may be best represented by a three- (e.g., Purdon et al.), four- (e.g., Harvey et al.; Khawaja & Armstrong; Stöber; Stumpf & Parker), or five-factor model (e.g., Cheng et al.; Cox et al.). In these models, Frost-MPS items designed to measure different dimensions often loaded on single factors. For example, items from the COM-Frost and DAA-Frost subscales, the PS-Frost and ORG-Frost subscales, and/or the PC-Frost and PE-Frost subscales often collapsed into single factors. Additionally, across these studies, some Frost-MPS items have displayed meaningful loadings on multiple factors (see Harvey et al.; Purdon et al.; Stöber) or have been deleted from the analysis to obtain a solution in which each remaining item had a high loading on its intended factor and a low loading on its unintended factors (e.g., Cox et al.; Khawaja & Armstrong). The range and variety of these factor solutions indicate that the latent dimensionality of the Frost-MPS is unclear and should be investigated in any research that utilizes the instrument.

Sport Anxiety Scale. A modified version of Smith et al.'s (1990) Sport Anxiety Scale (SAS: see Appendix I) was used to assess athletes' levels of competitive trait anxiety. On the basis of results from exploratory principal components and maximum-likelihood confirmatory factor analyses, Smith et al. proposed that the 21 items of the SAS can be grouped into three subscales measuring *Somatic Anxiety* (9 items), *Worry* (7 items), and *Concentration Disruption* (5 items). Smith et al. reported that all three subscales demonstrated acceptable levels of internal consistency across independent data sets (i.e., coefficient alpha levels > .70).

Although the SAS is the competitive trait anxiety measure of choice among most

contemporary sport anxiety researchers, there are questions regarding the instrument's factor structure (see Dunn & Causgrove Dunn, 2001; Dunn, Causgrove Dunn, Wilson, & Syrotuik, 2000; Prapavessis, Maddison, & Fletcher, 2005; Smith, Cumming, & Smoll, 2006). Dunn et al. (2000) examined the factorial composition and factor structure of the SAS using both exploratory and confirmatory factor analytic techniques with independent data sets. Although the results of Dunn et al.'s (2000) analyses supported the retention of three factors, the factor structures of their solutions differed slightly from Smith et al.'s (1990) original proposed structure. Specifically, Dunn et al.'s (2000) results indicated that it may be more appropriate to place two items from the original concentration disruption subscale (i.e.,"I have lapses of concentration because of nervousness" and "I get concerned that I won't be able to concentrate" [items 16 and 23, respectively, in the present version of the SAS]) into the worry subscale. These findings were supported by Dunn and Causgrove Dunn (2001) using confirmatory factor analysis and by Prapavessis et al. through item response theory and confirmatory factor analysis. Prapavessis et al. also indicated that a better fitting model was obtained when the somatic anxiety item which read "I feel nervous" (i.e., item 1 from the present version of the SAS) was removed from the instrument.

Most recently, Smith et al. (2006) examined the subscale item-composition of the SAS using confirmatory factor analysis (CFA) to compare two different SAS models. In the first model the two problematic concentration disruption items (i.e., items 16 and 23) were added to the worry subscale (as recommended by Dunn et al., 2000) and the problematic somatic anxiety item (i.e., item 1) was removed from the instrument (as recommended by Prapavessis et al., 2005). In the second model, items 1, 16, and 23 were

removed entirely from the instrument. Initial CFAs based on 327 male and female high school athletes' responses to the SAS indicated that both models produced similar high levels of fit to the data. However, subsequent CFAs focusing solely on the worry subscale indicated that a better fitting model was obtained when the subscale only contained the seven original worry items. As a result, Smith et al. recommended that items 16 and 23 be excluded from the scoring of the SAS. Due to the accumulation of evidence indicating that items 16 and 23 either (a) do not load onto their intended factor (e.g., Dunn & Causgrove Dunn, 2001; Dunn et al., 2000; Prapavessis et al., 2005) or (b) contribute to poorer fitting models (Smith et al., 2006), the present study followed Smith et al.'s recommendation and did not include responses to items 16 and 23 in analyses of SAS data.

Smith et al. also recommended that the somatic anxiety item in question (i.e., item 1) should not be scored when using the SAS. However, none of Smith et al.'s analyses provided evidence to support this decision. In fact, of the five studies that have examined the latent dimensionality of the SAS (i.e., Dunn & Causgrove Dunn, 2001; Dunn et al., 2000; Prapavessis et al., 2005; Smith et al., 2006; Smith et al., 1990), only Prapavessis et al. produced results suggesting that item 1 may be problematic. Because the majority of these studies have not indicated any psychometric problems associated with item 1, the item was included in this study.

There is also reason to question whether the SAS provides a representative assessment of the different sources of threat that athletes can perceive in competitive sport contexts (Dunn & Causgrove Dunn, 2001). For instance, while Dunn (1999) indicated that athletes perceive multiple sources of threat within the competitive sport

context (including fear of failure, fear of negative social evaluation, fear of physical danger, and fear of the unknown) the SAS worry subscale is comprised of six items that focus primarily on concerns over performance failure and only one item that focuses on concerns pertaining to negative social evaluation (Dunn & Causgrove Dunn). Concern over social evaluation is also considered to be a core component of perfectionism (Hewitt & Flett, 1991). Given that one of the purposes of the present study was to examine the relationship between competitive trait anxiety and perfectionism, the present version of the SAS was modified to include a greater focus on negative social evaluation in the sport context. To this end, the four items from the fear of negative social evaluation subscale of the *Collegiate Hockey Worry Scale* (CWHS: Dunn, 1999) were included with the 21 original SAS items. The fear of negative social evaluation subscale of the CWHS has been found to possess adequate levels of internal consistency (i.e., Cronbach's alphas [αs] $\geq .70$) and relates in theoretically meaningful ways to other dimensions of competitive trait anxiety (Dunn, 1999; Dunn & Causgrove Dunn, 2001) and competitive state anxiety (Dunn & Syrotuik, 2003). With the addition of these four items, the present version of the SAS contained a total of 25 items (see Appendix I). However, because items 16 and 23 were not scored, subsequent analyses involving this version of the SAS only included scores for 23 items.

In accordance with the original format of the SAS, the current instructions informed respondents that the purpose of the instrument was to examine how athletes "generally feel prior to and during competition" and participants used a 4-point scale (1 = *not at all*; 4 = *very much so*) to respond to each item. Given concerns regarding the factor structure of the original SAS (see Dunn et al., 2000; Prapavessis et al., 2005; Smith et al.,

2006) and the fact that the present study added four new items to the instrument, the psychometric properties of the present version of the SAS were explored in this study.

Procedure

Permission to conduct this study was granted by the Human Research Ethics Committee of the Faculty of Physical Education and Recreation at the University of Alberta. Coaches of intercollegiate varsity men's ice hockey teams in Western Canada were contacted by phone, e-mail, and letter to obtain permission to recruit their athletes as potential participants. Once permission was secured from the coaches, the researcher met with and presented the study to the members of each team at their home-ice training venues. Athletes were informed that the purpose of the study was to "examine athletes' attitudes, beliefs, and opinions regarding their athletic performance." Written informed consent was obtained from all athletes who wished to participate in the study. Instruments were completed during team meetings in classroom settings at least 24 hours prior to competition. Coaches were not present during the questionnaire administration period. The presentation order of the Sport-MPS-2, the Frost-MPS, and the SAS was counterbalanced to control for any order effects. The demographic questionnaire was always presented first.

Results

Psychometric Analyses

Sport Multidimensional Perfectionism Scale 2. As indicated earlier, it was deemed necessary to conduct a factor analytic investigation of the Sport-MPS-2 data to determine if the instrument's proposed six-factor composition was applicable in this study. In accordance with the factor analytic procedures utilized in Chapter 6, the first step in this

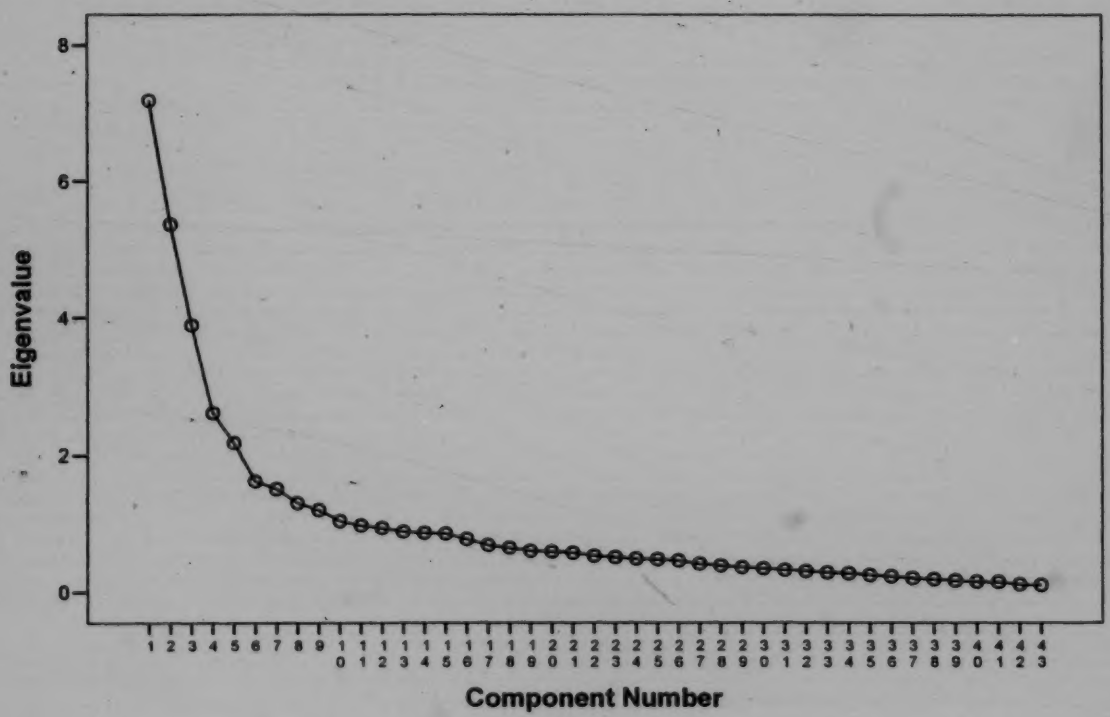
investigation was to utilize confirmatory factor analysis to test whether the this six-factor model (as presented in Table 6-6) provided an adequate fit to the Sport-MPS-2 data. Specifically, maximum likelihood confirmatory factor analyses (CFA) using LISREL 8.2 (Jöreskog & Sörbom, 1996a) were conducted on the inter-item covariance matrix (produced by PRELIS2: Jöreskog & Sörbom, 1996b) of the participants' Sport-MPS-2 responses. Both absolute fit indices (χ^2 test, GFI [Jöreskog & Sörbom, 1981], and RMSEA [Steiger, 1990]) and comparative/incremental fit indices (NNFI [Bentler & Bonett, 1980] and CFI [Bentler, 1990]) were used to evaluate model goodness of fit. Of these fit indices, only RMSEA (.69) indicated adequate model goodness of fit. That is, the χ^2 statistic was significant at $p < .00001$ and the GFI, NNFI, and CFI indices associated with each model were all < .90. Consequently, exploratory factor analysis (EFA) was used to further examine the latent structure of the Sport-MPS-2.

As a first step in this analysis, a principal components analysis (PCA) was conducted upon the Sport-MPS-2 inter-item correlation matrix to help determine the number of factors to extract. This analysis produced ten eigenvalues > 1.00 ($\lambda_1 = 7.19$, $\lambda_2 = 5.37$, $\lambda_3 = 3.89$, $\lambda_4 = 2.62$, $\lambda_5 = 2.18$, $\lambda_6 = 1.62$, $\lambda_7 = 1.51$, $\lambda_8 = 1.31$, $\lambda_9 = 1.20$, $\lambda_{10} = 1.05$). As recommended by Preacher and MacCallum (2003), the number of factors to retain was determined through consideration of the eigenvalue scree plot (Cattell, 1978), parallel analysis results (Lautenschlager, 1989), and past research (Fabrigar et al., 1999). The scree plot (see Figure 7-1) suggested the possible retention of five, seven, or nine factors. In contrast, parallel analysis suggested the retention of five factors although the value of the sixth eigenvalue ($\lambda_6 = 1.62$) was just below the minimum criterion eigenvalue that was required to retain a sixth factor ($\lambda_{6\ criterion} = 1.63$: Lautenschlager).

Previous empirical studies (see Chapter 6; Dunn, Gamache, et al., 2006) have suggested that the Sport-MPS-2 is best represented by six factors. Therefore, given the discrepancies between the scree plot and parallel analysis results, five-, six-, seven-, and nine-factor solutions were examined.

Figure 7-1

Scree plot of the eigenvalues for Sport-MPS-2 data.



Principal axes factoring (PA: see Tabachnick & Fidell, 1996) was utilized to extract the different numbers of factors. Each solution was subjected to a varimax rotation and an oblique direct oblimin transformation (delta = 0). To evaluate the

solutions, a pattern coefficient ≥ |.30| was deemed "meaningful" (Gorsuch, 1983) and the adequacy of each solution was examined using Thurstone's (1947) principle of simple structure (i.e., items with pattern coefficients ≥ |.30| on only one factor). Collectively, the oblique solutions pertaining to the five-, six-, seven-, and nine-factor solutions displayed better simple structure than the respective orthogonal solutions and were thus retained for further analysis. Therefore, in keeping with past factor analytic examinations of the Sport-MPS-2 and the original Sport-MPS, the oblique solutions were retained.

The degree to which items cross-loaded or failed to load on factors across the four solutions is summarized in Table 7-1. Most importantly, the interpretability of the six-factor solution was better than that of the five-, seven-, and nine-factor solutions, with all six factors corresponding closely to the six anticipated subscales of the Sport-MPS-2: namely PS-Sport, COM-Sport, PPP-Sport, PCP-Sport, DAA-Sport, and ORG-Sport (see Table 7-2). The pattern matrices for the five-, seven-, and nine-factor oblique solutions are contained in Appendix J along with a brief explanation as to why these solutions were rejected in favor of the six-factor solution shown in Table 7-2. The six-factor solution accounted for 53.18% of the total variance in the Sport-MPS-2 data. The inter-factor correlations for the six-factor solution are presented in Table 7-3.

Despite the highly interpretable factor structures of the six-factor solution, the item composition of some factors differed slightly from the proposed factor structure that was advocated and adopted in Chapter 6. Specifically, two PS-Sport items (i.e., item 8 ["If I do not set the highest standards for myself in my sport, I am likely to end up a second-rate player"] and item 18 ["It is important to me that I be thoroughly competent in

Table 7-1

Frequency of Problematic Items in the Five-, Six-, Seven-, and Nine-Factor Solutions According to Thurstone's (1947) Principle of Simple Structure

Factor Solution	Number of items without meaningful loadings on any factor	Number of items with meaningful loadings on two factors
Five-factor solution	0	4
Six-factor solution	2	3
Seven-factor solution	2	4
Nine-factor solution	1	4

Note. Loadings $\geq |.30|$ were deemed to be meaningful.

everything I do in my sport"]) did not did not have meaningful loadings (i.e., $> |.30|$) on any factor, although their highest loadings were on the PS-Sport factor in both cases. Another PS-Sport item (i.e., item 8: "I hate being less than the best at things in my sport") had meaningful pattern coefficients on both the PS-Sport and COM-Sport factors (pattern coefficients of .36 and .37 respectively). One PPP-Sport item (i.e., item 41: "My parents want me to be better than all other players who play my sport") had a pattern coefficient of .46 on the PPP-Sport factor and a marginal loading (.30) on the COM-Sport factor. Finally, one ORG-Sport item (item 35: "I develop plans that dictate how I want to perform during competition") had meaningful loadings on both its intended ORG-Sport factor (.35) as well as the PS-Sport factor (.36).

In accordance with the analytic protocol adopted in Chapter 6, factor scores for each participant were computed (using unique unit-weighting: Morris, 1979) for PS-Sport and COM-Sport subscales to examine the degree to which these unexpected factor loadings might influence conceptualization of these two subscales (from an item-

Table 7-2

Pattern Coefficients for Six-Factor Principal Axes Analysis of Sport-MPS-2 Data

		Factor number					
Item #	Intended subscale	1	2	3	4	5	6
1.	PS-Sport	.22	-.05	.13	.13	-.08	.27
8.	PS-Sport	**.37**	.12	.05	.05	-.05	**.36**
18.	PS-Sport	.19	.21	-.04	.14	.05	.27
22.	PS-Sport	.01	.18	-.03	-.07	.00	**.54**
24.	PS-Sport	.06	-.02	-.02	-.01	.13	**.54**
34.	PS-Sport	-.05	.19	-.02	.00	.05	**.69**
37.	PS-Sport	.06	.03	.04	.08	-.11	**.64**
2.	COM-Sport	**.46**	.06	.05	.02	.02	.07
10.	COM-Sport	**.54**	.05	.07	.11	.04	-.02
16.	COM-Sport	**.63**	-.04	.13	.01	-.06	-.02
25.	COM-Sport	**.41**	.13	.07	-.05	-.04	.01
29.	COM-Sport	**.35**	-.08	-.16	.10	.16	.22
33.	COM-Sport	**.64**	.00	-.02	.13	.12	-.04
40.	COM-Sport	**.77**	-.16	-.05	.15	.02	-.14
43.	COM-Sport	**.43**	-.06	-.06	-.11	.23	.15
4.	PPP-Sport	-.01	.02	**.67**	.01	-.10	.19
7.	PPP-Sport	-.09	.04	**.56**	.00	.26	-.17
11.	PPP-Sport	-.00	-.02	**.76**	.08	.07	.06
15.	PPP-Sport	-.08	-.17	**.64**	.15	-.00	.10
20.	PPP-Sport	.06	.07	**.77**	-.07	.11	-.15
26.	PPP-Sport	.09	-.01	**.76**	-.01	.14	-.29

Table 7-2 (Continued)

Item #	Intended subscale	Factor number 1	2	3	4	5	6
30.	PPP-Sport	.04	.03	**.71**	-.03	-.10	.18
39.	PPP-Sport	.20	.02	**.50**	.02	.11	-.19
41.	PPP-Sport	**.30**	-.02	**.46**	-.09	-.04	.10
6.	PCP-Sport	.03	.07	.04	**.65**	.00	-.12
13.	PCP-Sport	.08	.06	.00	**.64**	-.05	.10
17.	PCP-Sport	-.02	-.02	-.04	**.84**	.16	-.08
23.	PCP-Sport	.00	-.04	.05	**.87**	.02	-.16
27.	PCP-Sport	.04	.04	.03	**.48**	.08	.19
31.	PCP-Sport	.03	.07	.09	**.52**	-.15	.08
36.	PCP-Sport	-.06	-.04	-.12	**.64**	.14	.02
3.	DAA-Sport	.04	.04	-.01	.02	**.49**	.02
12.	DAA-Sport	.12	-.08	.04	.10	**.52**	.06
14.	DAA-Sport	-.16	-.02	.15	.07	**.56**	.05
21.	DAA-Sport	.12	-.02	.04	-.01	**.68**	-.06
32.	DAA-Sport	-.04	.01	.08	-.06	**.75**	.04
38.	DAA-Sport	.20	-.04	-.09	.14	**.39**	-.08
5.	ORG-Sport	.03	**.87**	-.03	.08	-.04	-.06
9.	ORG-Sport	.02	**.85**	.01	.04	.01	.00
19.	ORG-Sport	-.06	**.91**	-.03	.10	-.02	-.07
28.	ORG-Sport	.04	**.84**	-.09	.02	.00	.02
35.	ORG-Sport	-.06	**.35**	.05	-.08	-.01	**.36**
42.	ORG-Sport	-.03	**.42**	.09	-.10	.03	.25

Note. Pattern coefficients ≥ |.30| are in bold. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

Table 7-3

Inter-Factor Correlations for the Oblique Six-Factor Sport-MPS-2 Solution

Factor	PS-Sport	COM-Sport	PPP-Sport	PCP-Sport	DAA-Sport	ORG-Sport
PS-Sport						
COM-Sport	.28					
PPP-Sport	.04	.22				
PCP-Sport	.07	.32	.09			
DAA-Sport	-.04	.24	.13	.23		
ORG-Sport	.37	.04	.04	.03	-.14	

Note. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

composition perspective). Two sets of factor scores were computed for both PS-Sport and COM-Sport based on (a) the subscales' current factor structures, and (b) the subscales' anticipated factor structures (as indicated in Chapter 6).[2] Bivariate correlations were then calculated between the participants' factor scores on PS-Sport and COM-Sport according to the two solutions. The correlation between the PS-Sport factor scores was .93 and the correlation between the COM-Sport factor scores was .99. As indicated in Chapter 6, these high factor score correlations indicate that a high degree of shared variance exists between the present factor structures and the anticipated factor structures of the PS-Sport and COM-Sport subscales. Given that (a) the differences between these two factor structures are probably the result of idiosyncratic characteristics of the present sample

[2] Factor scores were not computed for PCP-Sport, PPP-Sport, DAA-Sport, or ORG-Sport because the current factor structures for these subscales corresponded directly with their anticipated factor structures.

(see Dunn, Causgrove Dunn, et al., 2006; Fabrigar et al., 1999), and (b) the factor labels of the PS-Sport and COM-Sport factors would not have been changed in the face of the unexpected factor loadings observed with this data set, the scoring for the PS-Sport and COM-Sport (as well as for the remaining four Sport-MPS-2 subscales) utilized in all subsequent analyses corresponded directly to the proposed item structure of each subscale adopted in Chapter 6 (see Table 7-4).

Table 7-4

Sport-MPS-2 Subscale Item Numbers

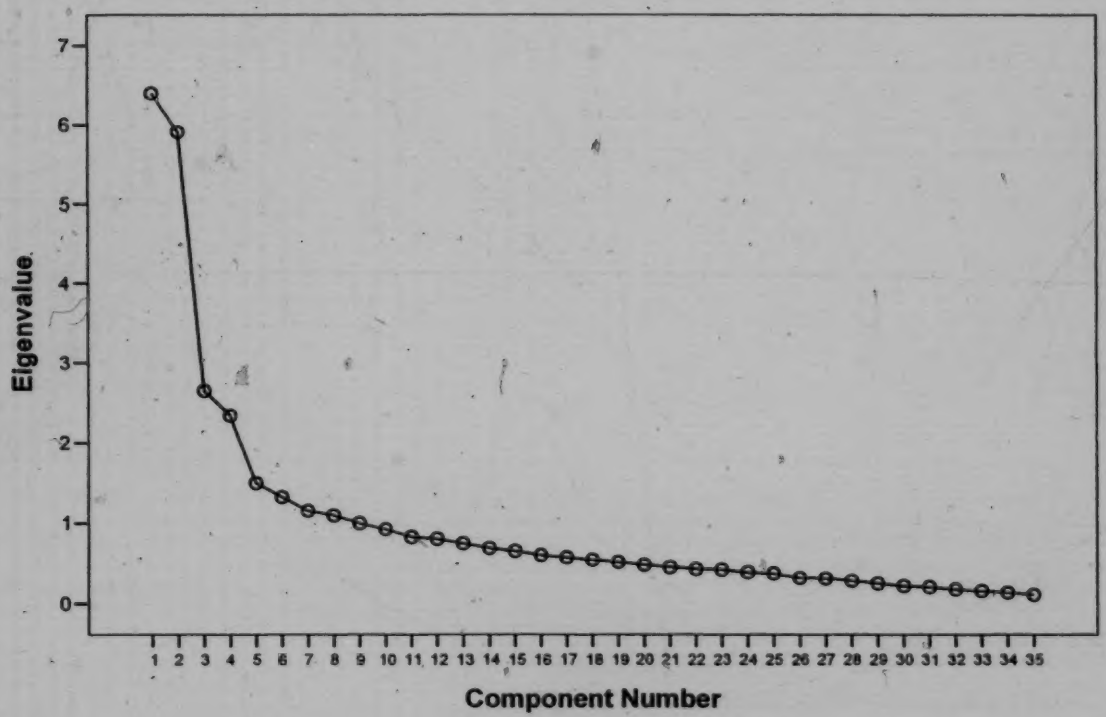
Sport-MPS-2 subscale	Subscale item numbers
Personal Standards	1, 8, 18, 22, 24, 34, 37
Concern Over Mistakes	2, 10, 16, 25, 29, 33, 40, 43
Perceived Parental Pressure	4, 7, 11, 15, 20, 26, 30, 39, 41
Perceived Coach Pressure	6, 13, 17, 23, 27, 31, 36
Doubts About Actions	3, 12, 14, 21, 32, 38
Organization	5, 9, 19, 28, 35, 42

Multidimensional Perfectionism Scale. The latent dimensionality of the Frost-MPS was examined due to the concerns regarding the instrument's factorial composition (see Cheng et al., 1999; Cox et al., 2002; Harvey et al., 2004; Khawaja & Armstrong, 2005; Purdon et al., 1999; Stöber, 1998; Stumpf & Parker, 2000). The same exploratory factor analytic procedures utilized to examine the Sport-MPS-2 data were used to examine the Frost-MPS data. A principal components analysis (PCA) produced eight eigenvalues > 1.00 ($\lambda_1 = 6.40$, $\lambda_2 = 5.91$, $\lambda_3 = 2.65$, $\lambda_4 = 2.34$, $\lambda_5 = 1.50$, $\lambda_6 = 1.32$, $\lambda_7 = 1.15$, $\lambda_8 = 1.08$). The resulting scree plot (see Figure 7-2) clearly suggested the retention

of four factors. This result was corroborated through parallel analysis. As a result, four factors were extracted using principal axes factoring (PA: see Tabachnick & Fidell, 1996). The resulting solution was then rotated using a varimax rotation and an oblique direct oblimin transformation (delta = 0).

Figure 7-2

Scree plot of the eigenvalues for Frost-MPS data.



The orthogonal solution contained six items (items 5, 9, 15, 16, 22, and 30) that had meaningful pattern coefficients on more than one factor, and one item (item 10) that did not load on any factor (i.e., the pattern coefficients associated with item 10 were ≤ |.30| across all factors). In contrast, the oblique solution contained only one item (item

32) that had a meaningful loading on more than one factor and only one item (item 10) that did not load on any factors. As a result, the oblique solution was retained. Items 32 and 10 were sucessively deleted and the data re-analyzed using PAF and direct oblimin transformations until a solution with simple structure across all items was attained (Gorsuch, 1983). As a result of this process, items 15 and 16 were also deleted because both items had multiple meaningful pattern coefficients in subsequent solutions. The final solution (see Table 7-5) contained 31 of the original 35 items and accounted for 51.97% of the total variance (before rotation) in the Frost-MPS data.

Examination of Table 7-5 indicates that the Frost-MPS is best represented by four interpretable factors in this study. The first factor was comprised of the six items of the ORG-Frost subscale (items 2, 7, 8, 27, 29, and 31) and was accordingly labelled *Organization* (ORG-Frost). The second factor was composed of seven COM-Frost items (items 9, 13, 14, 21, 23, 25, and 34) and three DAA-Frost items (items 17, 28, and 33). This factor was labelled *Concern and Doubts About Performance* (CDAP-Frost) to capture the characteristics of the concern over mistakes and doubts about actions dimensions (cf. Stöber, 1998). The third factor contained a combination of PE-Frost (items 1, 11, 20, and 26) and PC-Frost items (3, 5, 22, and 35). This factor was labelled *Perceived Parental Pressure* (PPP-Frost) because all items in this factor focus on perceptions of one's parents as sources of social pressure (cf. Purdon et al., 1999). The fourth and final factor contained PS-Frost items (items 4, 6, 12, 19, 24, and 30) and one COM-Frost item (item 18). Because this COM item ("I hate being less than the best at things") appears to fit well within Frost et al.'s (1990) conceptualization of personal standards, this fourth factor was labelled *Personal Standards* (PS-Frost). The inter-factor

Table 7-5

Pattern Coefficients for Principal Axes Analysis Conducted on Frost-MPS Data

		Factor Label			
Item	Intended Subscale	ORG	CDAP	PPP	PS
2.	Organization	**.71**	-.04	.03	.11
7.	Organization	**.88**	-.01	.03	-.07
8.	Organization	**.83**	.04	-.10	.09
27.	Organization	**.88**	-.03	.04	-.00
29.	Organization	**.89**	-.04	.06	-.04
31.	Organization	**.87**	.02	-.06	.03
9.	Concern Over Mistakes	-.04	**.41**	.08	.24
13.	Concern Over Mistakes	.12	**.53**	-.10	.20
14.	Concern Over Mistakes	-.15	**.51**	.00	.17
17.	Doubts About Actions	.08	**.45**	-.03	-.13
21.	Concern Over Mistakes	-.10	**.74**	-.04	.08
23.	Concern Over Mistakes	.00	**.61**	.14	.05
25.	Concern Over Mistakes	-.06	**.54**	.02	.25
28.	Doubts About Actions	-.03	**.54**	.08	-.10
33.	Doubts About Actions	.03	**.46**	.12	-.18
34.	Concern Over Mistakes	-.09	**.66**	.05	.01
1.	Parental Expectations	.00	-.21	**.55**	.15
3.	Parental Criticism	.04	.15	**.45**	.21
5.	Parental Criticism	-.02	.27	**.48**	-.07
11.	Parental Expectations	.16	.07	**.58**	.04
20.	Parental Expectations	.06	-.11	**.66**	.22
22.	Parental Criticism	-.02	.26	**.72**	-.24
26.	Parental Expectations	-.13	-.02	**.57**	-.11
35.	Parental Criticism	-.06	.21	**.73**	-.22

Table 7-5 (Continued)

Item	Intended Subscale	Factor Label			
		ORG	CDAP	PPP	PS
4.	Personal Standards	-.04	.03	.21	**.32**
6.	Personal Standards	.18	.03	.05	**.32**
12.	Personal Standards	.11	.05	-.03	**.67**
18.	Concern Over Mistakes	-.03	.26	-.04	**.44**
19.	Personal Standards	.06	-.16	-.04	**.64**
24.	Personal Standards	.05	.03	.07	**.54**
30.	Personal Standards	.24	.09	.01	**.62**

Note. Pattern coefficients ≥ |.30| are in bold. ORG = Organization, CDAP = Concerns and doubts about performance, PPP = Perceived parental pressure; PS = Personal standards. Inter-factor correlations: $r_{ORG\text{-}CDAP} = -.09$, $r_{ORG\text{-}PPP} = -.04$, $r_{ORG\text{-}PS} = .30$, $r_{CDAP\text{-}PPP} = .29$, $r_{CDAP\text{-}PS} = .14$, $r_{PPP\text{-}PS} = .13$.

correlations in this solution ranged from -.09 to .30. It should be noted that the present factorial composition is very similar to the factorial composition obtained in previous factor analytic examinations of the Frost-MPS (e.g., Cox et al., 2002; Harvey et al., 2004; Khawaja & Armstrong, 2005; Stöber, 1998; Stumpf & Parker, 2000) in which four factors have been retained.

Sport Anxiety Scale. The same factor analytic protocol was used to examine the latent dimensionality of the SAS. A principal components analysis was conducted on the inter-item correlation matrix of the 23 SAS items. This analysis produced four eigenvalues > 1.0 ($\lambda_1 = 7.68$, $\lambda_2 = 3.09$, $\lambda_3 = 2.04$, $\lambda_4 = 1.21$). Both parallel analysis results and the scree plot (see Figure 7-3) suggested the retention of three factors. As a result, three factors were extracted using principal axes factoring (PAF) and then rotated to

orthogonal and oblique solutions using varimax and direct oblimin (delta = 0) rotations, respectively. There were three items in the orthogonal solution that did not display simple structure (i.e., pattern coefficients ≥ |.30| on more than one factor: Thurstone, 1947). In contrast, all of the items in the oblique solution displayed simple structure. Due to its high degree of simple structure and interpretability, the oblique solution (see Table 7-6) was retained. This three-factor solution accounted for 55.69% of the variance in the SAS data.

Figure 7-3

Scree plot of the eigenvalues for SAS data.

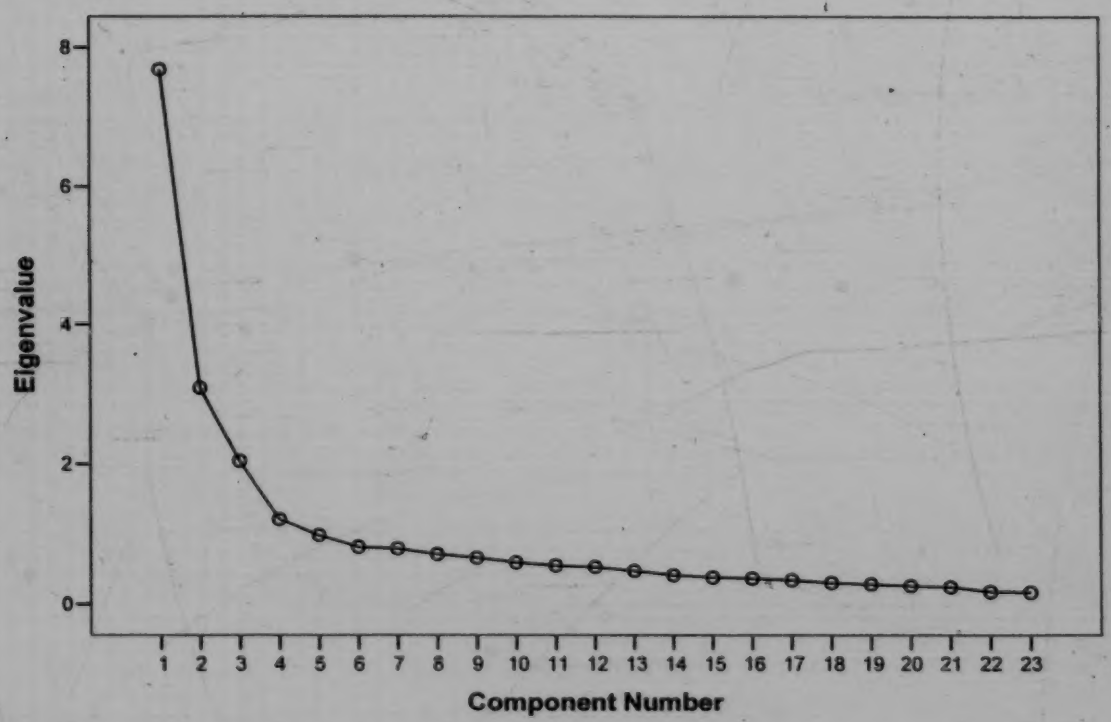


Table 7-6

Pattern Coefficients for Principal Axes Analysis Conducted on SAS Data

Item	Intended Subscale	Factor Label		
		Worry	Somatic Anxiety	Concentration Disruption
1.	Somatic Anxiety	.10	**.56**	-.01
4.	Somatic Anxiety	.27	**.55**	-.05
9.	Somatic Anxiety	-.12	**.81**	.04
12.	Somatic Anxiety	-.01	**.61**	-.12
13.	Somatic Anxiety	.00	**.68**	.25
17.	Somatic Anxiety	.02	**.61**	-.04
19.	Somatic Anxiety	.16	**.66**	-.07
21.	Somatic Anxiety	.00	**.68**	.10
24.	Somatic Anxiety	-.12	**.77**	-.06
3.	Worry	**.46**	.11	.26
5.	Worry	**.59**	.07	.16
10.	Worry	**.40**	.21	.24
11.	Worry	**.52**	.20	.24
15.	Worry	**.81**	-.02	-.08
18.	Worry	**.46**	.12	-.03
20.	Worry	**.92**	-.06	.09
6.	Negative Social Evaluation	**.77**	-.09	-.08
14.	Negative Social Evaluation	**.86**	-.13	.00
22.	Negative Social Evaluation	**.64**	.13	-.02
25.	Negative Social Evaluation	**.58**	-.01	.10
2.	Concentration Disruption	.01	-.08	**.90**
7.	Concentration Disruption	-.03	-.08	**.81**
8.	Concentration Disruption	.03	.04	**.45**

Note. Pattern coefficients ≥ |.30| are in bold. Items 16 and 23 were removed from the data set prior to the analysis.

The first factor in the oblique solution (see Table 7-6) was comprised of items from the original worry subscale of the SAS (items 3, 5, 10, 11, 15, 18, and 20) and the four newly added negative social evaluation items (items 6, 14, 22, and 25). These two sets of items focus on individuals' tendencies to worry about performance failure and unfavourable social evaluation within the competitive sport environment. As a result, this factor was labelled *Worry* (WOR) in accordance with Smith et al.'s (1990) original SAS subscale label. The second and third factors were respectively comprised of items originally designed to measure somatic anxiety (i.e., items 1, 4, 9, 12, 13, 17, 19, 21, and 24) and concentration disruption (i.e., items 2, 7, 8). Accordingly, the second factor was labelled *Somatic Anxiety* (SOM) and the third factor was labelled *Concentration Disruption* (CD). The inter-factor correlations between the three factors of this solution were: $r_{WOR\text{-}SOM} = .40$, $r_{WOR\text{-}CD} = .29$, and $r_{SOM\text{-}CD} = .16$.

Subscale characteristics. Subscale internal consistency estimates for the three instruments (Sport-MPS-2, Frost-MPS, and SAS) were examined using coefficient alpha (α). As seen in Table 7-7, the alphas associated with all subscales were > .70 indicating adequate levels of internal consistency. Table 7-7 also contains the mean item scores and standards deviations for each subscale.

Table 7-7

Subscale Means, Standard Deviations, and Internal Consistencies (α) for Sport-MPS-2, Frost-MPS, and SAS Subscales

Subscale	Instrument	*M*	*SD*	α
Personal Standards	Sport-MPS-2[a]	3.64	.58	.77
Concern Over Mistakes	Sport-MPS-2[a]	2.80	.66	.79
Perceived Parental Pressure	Sport-MPS-2[a]	2.18	.68	.87
Perceived Coach Pressure	Sport-MPS-2[a]	3.07	.75	.85
Doubts About Actions	Sport-MPS-2[a]	2.50	.63	.77
Organization	Sport-MPS-2[a]	3.81	.70	.88
Personal Standards	Frost-MPS[a]	3.49	.58	.74
Organization	Frost-MPS[a]	3.71	.74	.94
Perceived Parental Pressure	Frost-MPS[a]	2.45	.66	.82
Concern and Doubts About Performance	Frost-MPS[a]	2.45	.57	.82
Worry	SAS[b]	2.13	.63	.90
Somatic Anxiety	SAS[b]	1.78	.55	.88
Concentration Disruption	SAS[b]	1.80	.61	.76

[a] Possible Range = 1 – 5

[b] Possible Range = 1 – 4

Relationships Among the Sport-MPS-2 and Frost-MPS Subscales

Intra-scale bivariate relationships. Bivariate correlations were calculated among the Sport-MPS-2 and the Frost-MPS subscales (Table 7-8). Among the Sport-MPS-2 subscales, PS-Sport had a small significant positive correlation with PCP-Sport and moderate positive correlations with both ORG-Sport and COM-Sport. The COM-Sport subscale also had moderate positive correlations with PPP-Sport, PCP-Sport, and DAA-Sport. Finally, DAA-Sport had low to moderate positive correlations with both PPP-Sport

and PCP-Sport. The pattern of bivariate correlations among the Frost-MPS subscales mirrored that of the Sport-MPS-2 subscales. The PS-Frost subscale had low to moderate correlations with ORG-Frost, CDAP-Frost, and PPP-Frost. The CDAP-Frost subscale also had a moderate positive correlation with the PPP-Frost subscale.

Inter-scale bivariate relationships. As hypothesized, examination of the bivariate correlations between the Sport-MPS-2 and Frost-MPS subscales revealed moderate to strong positive correlations between subscales that were expected to represent conceptually similar dimensions of perfectionism (see Table 7-8)[3]. Specifically, there were strong significant positive correlations between PS-Sport and PS-Frost (r = .64), COM-Sport and CDAP-Frost (r = .66), and PPP-Sport and PPP-Frost (r = .76) as well as moderate positive correlations between ORG-Sport and ORG-Frost (r = .35) and DAA-Sport and CDAP-Frost (r = .45). The PS-Sport subscale was also moderately correlated with the remaining three subscales of the Frost-MPS (i.e., ORG-Frost, CDAP-Frost, and PPP-Frost). The ORG-Sport subscale was moderately correlated with PS-Frost, and the COM-Sport subscale had a moderate positive correlation with the PS-Frost and PPP-Frost subscales. There were also moderate positive correlations between PPP-Sport and CDAP-Frost, and between PCP-Sport and CDAP-Frost. Finally, there was a low, but significant, correlation between PCP-Sport and PPP-Frost.

[3] The bivariate correlations between Sport-MPS-2 and SAS subscales are presented in Appendix K.

Table 7-8

Bivariate Correlations Between Sport-MPS-2 and Frost-MPS Subscales

	Instrument									
	Sport-MPS-2						Frost-MPS			
Subscale	PS	ORG	COM	PPP	PCP	DAA	PS	ORG	CDAP	PPP
PS-Sport										
ORG-Sport	.47***									
COM-Sport	.40***	.04								
PPP-Sport	.14	.02	.28***							
PCP-Sport	.19**	.06	.36***	.14						
DAA-Sport	.05	-.13	.35***	.24***	.29***					
PS-Frost	.64***	.42***	.30***	.09	.11	-.07				
ORG-Frost	.22**	.35***	-.05	-.06	-.08	-.16*	.35***			
CDAP-Frost	.27***	-.04	.66***	.37***	.35***	.45***	.24***	-.10		
PPP-Frost	.17*	.05	.27***	.76***	.15*	.16*	.19*	-.02	.37***	

Note. PS-Sport = Personal standards; ORG-Sport = Organization; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; PS-Frost = Personal standards; ORG-Frost = Organization; CDAP-Frost = Concern and doubts about performance; PPP-Frost = Perceived parental pressure.

* $p \leq .05$; ** $p \leq .01$, *** $p \leq .001$.

Stepwise multiple regression analyses. A series of stepwise multiple regression analyses were conducted to further examine the hypothesis that there would be strong relationships between conceptually analogous subscales of the Sport-MPS-2 and Frost-MPS. In each of these analyses, one of the Sport-MPS-2 subscales was entered as the dependent variable with the four Frost-MPS subscales entered as the independent variables. Significant regression equations were produced in each multiple regression analysis (see Table 7-9). In general, Sport-MPS-2 subscales were most strongly related to analogous Frost-MPS subscales. Specifically, examination of the statistically significant standardized regression coefficients (βs) and partial correlations associated with each independent variable (i.e., each Frost-MPS subscale) at every step of the each analysis revealed that PS-Sport was best predicted by PS-Frost, COM-Sport was best predicted by CDAP-Frost, PPP-Sport was best predicted by PPP-Frost, and DAA-Sport was best predicted by CDAP-Frost (βs ranged from .348 to .758). These results provide excellent criterion-related validity evidence for using the PS-Sport, COM-Sport, PPP-Sport, and DAA-Sport subscales as measures of perfectionism in sport settings.

A somewhat unexpected result was obtained for the ORG-Sport subscale. As hypothesized, ORG-Sport was significantly predicted by ORG-Frost ($\beta = .230$ at the second step), however, the stronger predictor of ORG-Sport was PS-Frost ($\beta = .416$ at the first step and .335 at the second step). Finally, the only significant predictor of PCP-Sport was CDAP-Frost ($\beta = .348$) suggesting a positive relationship between athletes' perceptions of their coach as a source of social pressure and their concerns and doubts about the quality of their performances.

Table 7-9

Stepwise Multiple Regression Analyses of Sport-MPS-2 Subscales on Frost-MPS Subscales

Sport-MPS-2 subscale	Step		β	*t*	*p*	Change in R^2	Partial correlation
Personal standards	1	$F(1, 179) = 127.01, p < .001, R^2 = .415$				.415	
		PS-Frost	.644	11.27	<.001		.64
	2	$F(2, 178) = 66.82, p < .001, R^2 = .429$				.014	
		PS-Frost	.615	10.55	<.001		.62
		CDAP-Frost	.121	2.07	< .05		.15
Organization	1	$F(1, 179) = 37.50, p < .001, R^2 = .173$				.173	
		PS-Frost	.416	6.12	<.001		.42
	2	$F(2, 178) = 25.02, p < .001, R^2 = .219$				.046	
		PS-Frost	.335	4.73	<.001		.33
		ORG-Frost	.230	3.25	< .01		.24
Concern over mistakes	1	$F(1, 179) = 138.49, p < .001, R^2 = .436$				.436	
		CDAP-Frost	.660	11.77	<.001		.66
	2	$F(2, 178) = 75.54, p < .001, R^2 = .459$				.023	
		CDAP-Frost	.623	10.98	<.001		.64
		PS-Frost	.156	2.74	< .01		.20
Perceived coach pressure	1	$F(1, 179) = 24.69, p < .001, R^2 = .121$				.121	
		CDAP-Frost	.348	4.97	<.001		.35
Doubts about actions	1	$F(1, 179) = 45.62, p < .001, R^2 = .203$				.203	
		CDAP-Frost	.451	6.75	<.001		.45
	2	$F(2, 178) = 27.47, p < .001, R^2 = .236$				.033	
		CDAP-Frost	.495	7.34	<.001		.48
		PS-Frost	-.186	-2.76	< .01		-.20

Table 7-9 (Continued)

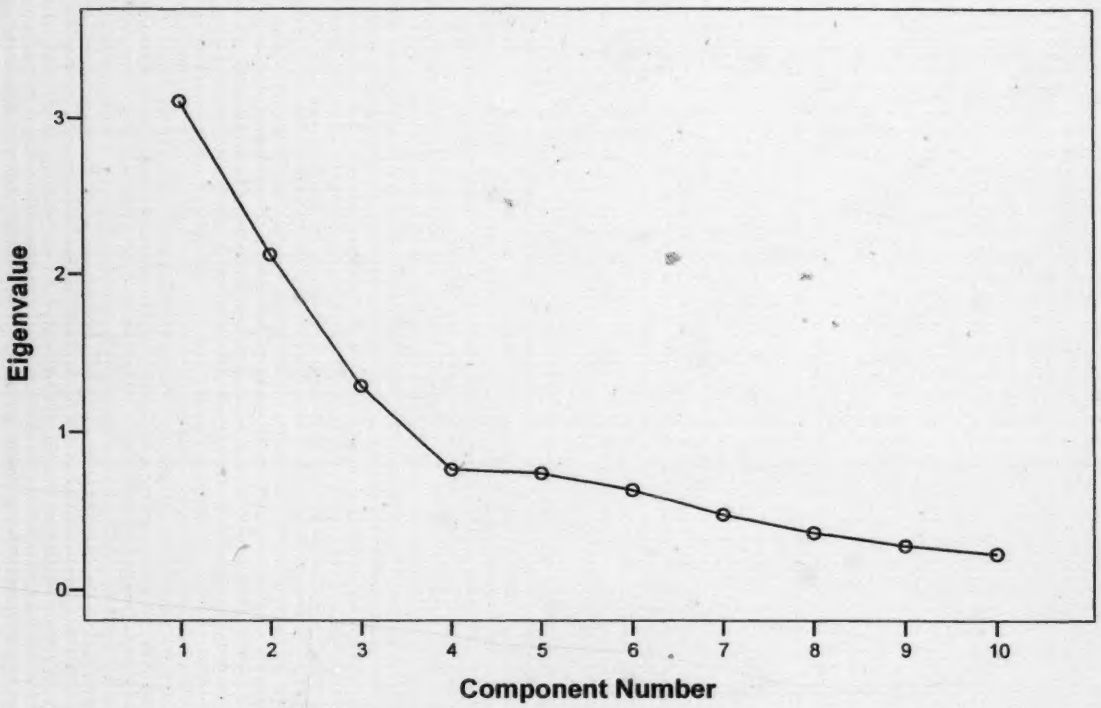
Sport-MPS-2 subscale	Step		β	*t*	*p*	Change in R^2	Partial correlation
Perceived parental pressure	1	$F(1, 179) = 241.79, p < .001, R^2 = .575$				.575	
		PPP-Frost	.758	15.55	<.001		.76
	2	$F(2, 178) = 125.05, p < .001, R^2 = .584$				.009	
		PPP-Frost	.719	13.84	<.001		.72
		CDAP-Frost	.105	2.03	< .05		.15

Note. Only significant predictors at each step in the analyses are shown in the table. PS-Frost = Frost-MPS personal standards; ORG-Frost = Frost-MPS organization; CDAP-Frost = Frost-MPS concern and doubts about performance; PPP-Frost = Frost-MPS perceived parental pressure.

Exploratory factor analysis. A subscale-level exploratory factor analysis was conducted upon the correlation matrix of Sport-MPS-2 and Frost-MPS subscales to determine if latent dimensions similar to Frost et al.'s (1993) *maladaptive evaluation concerns* and *positive striving* factors would underlie the subscales of the two instruments. In other words, the correlation matrix that was analyzed contained all the correlation coefficients among and between the six Sport-MPS-2 subscales and the four Frost-MPS subscales (see Table 7-8). This analysis followed the same protocol that was previously used to examine the latent structures of the Sport-MPS-2, Frost-MPS, and SAS at the item level. A principal components analysis (PCA) produced three eigenvalues > 1.0 ($\lambda_1 = 3.11, \lambda_2 = 2.12, \lambda_3 = 1.29$). The scree plot (see Figure 7-4) suggested the retention of three factors, but parallel analysis results suggested the retention of two factors. Moreover, previous subscale-level (Bieling, et al., 2004; Frost et al., 1993) and second-order (Cox et al., 2002; Stumpf & Parker, 2000) factor analytic

Figure 7-4

Scree plot of the eigenvalues following subscale-level factor analysis of correlations among Sport-MPS-2 and Frost-MPS data.



examinations of Frost-MPS data have indicated that two factors are generally used to best represent the higher-order dimensionality of the instrument's subscales. Nevertheless, given the lack of congruence between the scree plot and parallel analysis, two- and three-factor solutions were examined.

Factors were extracted using principal axes factoring and subjected to both orthogonal (i.e., varimax) and oblique (i.e., direct oblimin [delta = 0]) rotations. Following the extraction of two factors, both the orthogonal and oblique solutions were

very similar in terms of factorial composition, factor structure, and simple structure (Thurstone, 1947). Additionally, the correlation between the two factors in the oblique solution was very small (r = .07) indicating that the factors may be best considered orthogonal in nature. As a result, the two-factor orthogonal solution produced through varimax rotation (see Table 7-10) was selected as a better representation of the data.[4]

The subscales in the two-factor solution (see Table 7-10) with moderate to high pattern coefficients on the first factor were COM-Sport, PCP-Sport, PPP-Sport, DAA-Sport, CDAP-Frost, and PPP-Frost. The PS-Sport subscale had a weak (but meaningful) pattern coefficient (.32) on the first factor as well. In general, these subscales reflect tendencies to be overly concerned with personal performance and whether less-than-perfect personal performances will draw harsh criticism from parents and coaches. The PS-Sport, ORG-Sport, PS-Frost, and ORG-Frost subscales had moderate to high loadings on the second factor. These subscales reflect tendencies to use plans and routines to aid in efforts to achieve high standards of performance and organization. The composition of these two factors correspond closely to the two-factor solution produced by Frost et al.'s (1993) subscale-level factor analysis that included subscales from the Frost-MPS and Hewitt and Flett's *Multidimensional Perfectionism Scale* (1991). As a result, the same factor labels used by Frost et al. were utilized in the present study. That is, the first factor was labelled *Maladaptive Evaluation Concerns*, and the second factor was labelled

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[4] The orthogonal and oblique three-factor solutions were also very similar in terms of factorial composition, factor structure, and simple structure (Thurstone, 1947). The orthogonal solution produced through varimax rotation is presented in Appendix L. As indicated, the third factor in this solution was comprised of the PPP-Sport and PPP-Frost subscales. Factor analysts (Fabrigar et al., 1999) advocate against the retention of factors comprised of only two variables/items. As a result, the three-factor solution was rejected in favor of the two-factor solution.

Positive Striving. These two factors accounted for 52.32% of the total variance in the analysis.

Table 7-10

Pattern Coefficients for Subscale-Level Principal Axis Factor Analysis of Sport-MPS-2 and Frost-MPS Subscales with Varimax Rotation

		Factor	
Subscale	Instrument	F_1	F_2
Personal Standards	Sport-MPS-2	**.32**	**.73**
Organization	Sport-MPS-2	-.04	**.62**
Concern Over Mistakes	Sport-MPS-2	**.70**	.19
Perceived Parental Pressure	Sport-MPS-2	**.57**	.00
Perceived Coach Pressure	Sport-MPS-2	**.42**	.05
Doubts About Actions	Sport-MPS-2	**.51**	-.18
Personal Standards	Frost-MPS	.21	**.77**
Organization	Frost-MPS	-.16	**.46**
Concern and Doubts About Mistakes	Frost-MPS	**.81**	.04
Perceived Parental Pressure	Frost-MPS	**.54**	.07

Note. Pattern coefficients ≥ |.30| are in bold. F_1 = Maladaptive evaluation concerns; F_2 = Positive striving.

Sport Perfectionism Profiles and Competitive Trait Anxiety

Parker's (1997) cluster analytic protocol was utilized to begin the process of determining if athletes' CTA levels differed as a function of their perfectionist orientations. Mean item Sport-MPS-2 subscale scores were subjected to hierarchical cluster analysis using Ward's agglomerative method of cluster formation with squared Euclidean distance measures. All scores were standardized prior to analysis to ensure that

all the variables were measured on the same scale (see Hair, Anderson, Tatham, & Black 1998, for a related discussion).

Hair et al.'s (1998) "stopping rule" was used to determine the number of clusters to retain from the hierarchical cluster analysis. In accordance with this rule, the agglomeration schedule was examined to identify the largest percentage changes between successive agglomeration coefficients.[5] As seen in Table 7-11, the largest percentage changes in the agglomeration schedule occurred when moving from a three- to a two-cluster solution and from a two- to a one-cluster solution. Hair et al. state that when large increases in the agglomeration coefficients occur between two successive cluster solutions, the prior cluster solution should be chosen as a better representation of the data because the combination of the two solutions "caused a substantial decrease in [within-cluster] similarity" (p. 499). As a result, the three cluster solution was chosen as the best representation of the data. Visual inspection of the cluster-formation dendrogram (see Appendix M) indicated that there were no outliers in the data that may have had an undue impact on the cluster solution.

In accordance with Parker's (1997) protocol and Hair et al.'s (1998) recommendations, a nonhierarchical (K-means) cluster analysis was conducted upon the same data set to "fine-tune" the results from the hierarchical analysis. The centroids (i.e., Sport-MPS-2 subscale means) from the three retained clusters were used as initial seed points in the nonhierarchical cluster analysis. The analysis converged upon the final three-cluster solution after seven iterations. Table 7-12 displays the number of

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[5] Agglomeration coefficients represent the within-cluster sum of squared deviations that result every time clusters are combined. "Joining two very different clusters results in a large coefficient or a large percentage change in the coefficient" (Hair et al., p. 503). Conceptually, using Hair et al.'s stopping rule to determine the number of clusters to retain in cluster analysis is similar to using a scree test to determine the number of factors to retain in factor analysis.

participants in each cluster and the unstandardized mean item Sport-MPS-2 subscale scores and corresponding standard deviations.

Table 7-11

Agglomeration Schedule for the Last Ten Clusters Produced from a Hierarchical Cluster Analysis of Sport-MPS-2 Data

Number of Clusters	Agglomeration Coefficient	Percent Change
10	477.719	4.95%
9	501.369	5.40%
8	528.422	6.46%
7	562.567	7.89%
6	606.969	7.78%
5	654.170	9.82%
4	718.448	10.16%
3	791.508	15.36%
2	913.078	18.28%
1	1080.000	–

For descriptive purposes, a multivariate analysis of variance (MANOVA) was conducted to determine if the three clusters differed on mean Sport-MPS-2 subscale scores. Cluster membership (i.e., Clusters 1, 2, and 3) was entered as the independent variable and the six Sport-MPS-2 subscales were entered as dependent variables. A significant multivariate test statistic was obtained: Wilks' $\Lambda = .184$, $F\,(12, 346) = 38.43$, $p < .001$, $\eta^2 = .571$, indicating the presence of between cluster differences. Follow-up univariate *F*-tests revealed statistically significant cluster differences on each of the six Sport-MPS-2 subscales (see Table 7-12).

Table 7-12

Sport-MPS-2 Mean Item Scores, Standard Deviations, and Univariate Test Statistics for Between-Cluster Comparisons

	Cluster								
	Cluster 1 Non-Perfectionists (n = 50)		Cluster 2 Maladaptive Perfectionists (n = 76)		Cluster 3 Adaptive Perfectionists (n = 55)		Univariate test statistics		
Sport-MPS-2	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	F (2, 178)	p	Partial η^2
PS-Sport	3.13_a	.43	4.03_b	.45	3.58_c	.48	59.03	< .001	.399
ORG-Sport	3.10_a	.69	4.06_b	.45	4.10_b	.53	57.48	< .001	.392
COM-Sport	2.65_a	.53	3.33_b	.42	2.19_c	.39	108.97	< .001	.550
PPP-Sport	$2.17_{a,b}$	.72	2.36_a	.70	1.95_b	.52	6.24	< .01	.066
PCP-Sport	3.04_a	.72	3.43_b	.64	2.59_c	.64	25.43	< .001	.222
DAA-Sport	2.72_a	.46	2.71_a	.64	2.01_b	.44	33.51	< .001	.274

Note. Means with different subscripts indicate significant within-row differences between clusters following post-hoc independent *t*-tests with Bonferroni corrections (all *p*s < .01). Sport-MPS-2 subscale abbreviations: PS-Sport = Personal standards; ORG-Sport = Organization; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions.

Mean contrasts (i.e., independent *t*-tests with Bonferroni corrections) were conducted to identify which clusters differed on each of the Sport-MPS-2 subscales. Effect sizes (ES) were also computed for each contrast using Cohen's (1977) ES index for independent samples. As seen in Table 7-12, Cluster 2 had significantly higher mean scores on PS-Sport, COM-Sport, PCP-Sport, and DAA-Sport than Clusters 1 and 3. Cluster 2 also had significantly higher ORG-Sport scores than Cluster 1, and higher PPP-Sport scores than Cluster 3. Cluster 3 had significantly higher PS-Sport and ORG-Sport mean scores than Cluster 1 as well as the lowest COM-Sport, PCP-Sport, and DAA-Sport scores among all three clusters. Finally, Cluster 1 had the lowest PS-Sport and ORG-Sport scores and significantly higher COM-Sport, PCP-Sport, and DAA-Sport scores than Cluster 3. The effect sizes associated with these significant differences ranged from .59 to 2.85 suggesting meaningful differences.

The patterns of mean Sport-MPS-2 subscale scores in Clusters 2 and 3 are in-line with Hamachek's (1978) description of maladaptive and adaptive perfectionism. For example, in accordance with maladaptive and adaptive perfectionism alike, athletes in both clusters reported the tendency to set high personal standards of performance (PS-Sport)—although maladaptive perfectionists' standards appear to be higher than adaptive perfectionists' standards. Similarly, both clusters also reported the tendency to use plans or routines to dictate their behavior before and during competition (ORG-Sport). However, athletes in Cluster 2 reported a higher degree of sensitivity to mistakes (COM-Sport), more doubt about the quality of their pre-performance preparation (DAA-Sport), and greater concerns over the social expectations and pressure imposed by coaches (PCP-Sport) and parents (PPP-Sport) than athletes in

Cluster 3. Previous cluster analytic studies of Frost-MPS data have also shown that maladaptive or unhealthy perfectionism clusters typically have the highest scores on the COM-Frost, DAA-Frost, and PC-Frost subscales (see Parker, 1997; Parker; Rice & Dellwo, 2002; Rice et al., 2003; Rice & Lapsley, 2001; Rice & Mirzadeh, 2000). These studies have also found that adaptive or healthy perfectionism clusters typically have high PS-Frost and ORG-Frost scores, but the lowest scores on the dysfunctional COM-Frost, DAA-Frost, and PC-Frost subscales. Consequently, Cluster 2 was labelled *Maladaptive Perfectionists*, and Cluster 3 was labelled *Adaptive Perfectionists*.

The athletes in Cluster 1 reported lower tendencies to set high standards of personal performance (PS-Sport) and were less inclined to use plans to guide their behavior in preparation for and during athletic competitions (ORG-Sport) than both the maladaptive and adaptive perfectionist athletes (i.e., Cluster 2 and 3, respectively). Previous studies that cluster analyzed Frost-MPS data have indicated that non-perfectionists tend to display lower PS-Frost and ORG-Frost scores than both maladaptive and adaptive perfectionists (see Parker, 1997; Parker; Rice & Dellwo, 2002; Rice et al., 2003; Rice & Lapsley, 2001; Rice & Mirzadeh, 2000). As a result, Cluster 1 was labelled *Non-perfectionists*.

Having established unique profiles of perfectionism, a second MANOVA was conducted to determine if the clusters differed in terms of their competitive trait anxiety levels. Cluster membership was entered as the independent variable and the three subscales of the modified SAS (i.e., *worry*, *somatic anxiety*, and *concentration disruption*) were entered as the dependent variables. Descriptive statistics for each of the SAS subscales across the three clusters are shown in Table 7-13. A significant

multivariate test statistic was obtained: Wilks' $\Lambda = .750$, $F(6, 352) = 9.09$, $p < .001$, $\eta^2 = .134$. Follow-up univariate *F*-tests revealed significant between-cluster differences for each SAS subscale (see Table 7-13).

Mean contrasts (i.e,, independent *t*-tests with Bonferroni corrections) were then conducted to identify specific cluster differences on each SAS subscale. Effect sizes (ES) were computed for each contrast using Cohen's (1977) *ES* index for independent samples. The results of these contrasts (see Table 7-13) revealed that the maladaptive perfectionists (Cluster 2) had significant higher somatic anxiety and worry mean scores than adaptive perfectionists (Cluster 3) and non-perfectionists (Cluster 1). Effect sizes for these differences ranged from .46 to 1.27. Maladaptive perfectionists also had significantly higher concentration disruption mean scores than adaptive perfectionists (*ES* = .71). Adaptive perfectionists also had significantly lower mean worry and mean concentration disruption scores than non-perfectionists (*ES*s = .66 and .61, respectively). These results are generally in line with the anticipated CTA differences between maladaptive and adaptive perfectionists in sport, providing further criterion validity evidence for the Sport-MPS-2.

Table 7-13

SAS Mean Item Scores, Standard Deviations, and Univariate Test Statistics for Between-Cluster Comparisons

	Cluster								
	Cluster 1 Non-Perfectionists (n = 50)		Cluster 2 Maladaptive Perfectionists (n = 76)		Cluster 3 Adaptive Perfectionists (n = 55)		Univariate test statistics		
SAS	*M*	(*SD*)	*M*	(*SD*)	*M*	(*SD*)	F (2, 178)	p	Partial η^2
SOM	1.69_a	.46	1.94_b	.58	1.63_a	.54	6.39	< .01	.07
WOR	2.11_a	.63	2.42_b	.58	1.75_c	.46	22.88	< .001	.20
CD	1.86_a	.66	1.79_a	.59	1.44_b	.51	7.98	< .001	.08

Note. Means with different subscripts indicate significant within-row differences between clusters following post-hoc independent *t*-tests with Bonferroni corrections (all *p*s < .05). SAS subscale abbreviations: SOM = Somatic anxiety; WOR = Worry; CD = Concentration disruption.

Discussion

The purpose of this study was to establish external validity evidence for the perfectionism assessments produced by the Sport-MPS-2. To this end, relationships between the subscales of the Sport-MPS-2 and the Frost-MPS were examined. Due to the similar conceptual frameworks underlying the two instruments, it was hypothesized that there would be strong positive relationships between conceptually analogous subscales of the two instruments. Strong support was obtained via inter-scale bivariate correlations (see Table 7-8). Specifically, there were strong positive correlations between PS-Sport and PS-Frost, ORG-Sport and ORG-Frost, COM-Sport and CDAP-Frost, DAA-Sport and CDAP-Frost, and PPP-Sport and PPP-Frost. Moreover, as revealed by the stepwise multiple regression analyses (see Table 7-9), the strongest predictor of the PS-Sport, COM-Sport, DAA-Sport, and PPP-Sport subscales were conceptually analogous Frost-MPS subscales (i.e., PS-Frost, CDAP-Frost, CDAP-Frost, and PPP-Frost, respectively).

One result that was not in-line with the expected hypothesis concerned the ORG-Sport subscale. While this subscale did have a significant positive correlation with ORG-Frost (r = .35), it had a higher correlation with PS-Frost (r = .42). The multiple regression analyses (see Table 7-9) also suggested that PS-Frost was the strongest predictor of ORG-Sport, although ORG-Frost did explain a significant amount of unique variance in ORG-Sport responses (partial r = .24).

The ORG-Sport subscale was designed to represent the organization dimension of perfectionism within the domain of sport. In contrast, the ORG-Frost subscale was designed by Frost et al. (1990) to measure organization at a global level. This distinction is represented by differences in the operational definitions of the two constructs.

Specifically, as noted in Chapter 4, ORG-Sport is designed to measure "athletes' tendencies to establish and implement plans or routines that dictate their behavior prior to and during competition in their primary sport." In contrast, Frost et al. designed the ORG-Frost subscale to measure an individual's "preference for order and organization" (Frost et al., p. 453).

Several researchers have indicated that Frost et al.'s (1990) global conceptualization of organization may have limited applicability within the sport domain. As noted previously, during the development of the original Sport-MPS, Dunn et al. (2002) reported that it would be difficult to adapt ORG-Frost items (e.g., "I am a neat person"; "Neatness is very important to me") to fit the domain of sport. Similarly, Anshel and Eom stated that "the content of numerous [ORG-Frost] items is irrelevant to sport contexts" (2003, p. 260). Given the differences in the operational definitions of the ORG-Sport and ORG-Frost subscales, and corresponding differences in the item content of the two subscales, the bivariate correlation and multiple regression results indicate that the two subscales appear to measure related constructs that function in unique ways according to their situational or contextual frame of reference. In other words, although both subscales share the same label and reflect individual differences in people's preference for planning and order, they do not necessarily measure or conceptualize this preference for order and planning in the same way (see Marsh, 1994, for a related discussion).

Why then would the multiple regression results (see Table 7-9) indicate that the PS-Frost subscale was the best predictor of ORG-Sport? It is possible that athletes with high levels of global personal standards (as measured by PS-Frost) translate these

standards into aspects of their competitive routines. In other words, athletes who hold high personal standards in life may also view their competitive routines and planning as part of these high standards. As such, the PS-Frost subscale may tap into ORG-Sport perfectionism to a greater degree than ORG-Frost. Clearly, more research is required to better understand the relationship between ORG-Sport and the PS-Frost and ORG-Frost subscales.

No specific hypotheses were offered with respect to which Frost-MPS subscales would best predict the PCP-Sport subscale because there is no Frost-MPS subscale that identifies the social pressures that athletes perceive from their coaches (Dunn et al., 2002). The multiple regression results revealed that CDAP-Frost was the only significant predictor of PCP-Sport (see Table 7-9). This result could be explained if the interpersonal nature of the constructs represented by CDAP-Frost and PCP-Sport is considered. The CDAP-Frost factor in this study contained items that were originally intended to represent separate subscales measuring global representations of concern over mistakes and doubts about actions (Frost et al., 1990). However, past research (e.g., Cox et al., 2000; Flett, Sawatzky, & Hewitt, 1995; Frost et al., 1993) has indicated that both of these subscales are significantly correlated to the socially prescribed perfectionism subscale of Hewitt and Flett's (1991) *Multidimensional Perfectionism Scale* (all *r*s between .28 and .59). The socially prescribed perfectionism subscale (SPP-Hewitt) of Hewitt and Flett's perfectionism instrument (i.e., the Hewitt-MPS) represents an interpersonal view of global perfectionism in that it assesses the degree to which individuals perceive significant others as sources of social pressure. Similarly, Dunn, Causgrove Dunn, et al.

(2006) recently found that the COM-Sport subscale of the original Sport-MPS was strongly correlated with SPP-Hewitt (*r*s = .62 and .70 across two independent samples).

Dunn, Causgrove Dunn, et al. (2006) stated that "concern over mistakes are intra-personal in that mistakes are judged against failure to meet self-referenced standards, and interpersonal in that failure to meet the standards are then judged according to how others will view these failures" (2006, p. 74). The interpersonal nature of concern over mistakes is reflected in several CDAP-Frost items that were originally intended as concern over mistakes items (e.g., item 34: "The fewer mistakes I make, the more people will like me"; item 21: "People will probably think less of me if I make a mistake"). Perhaps it is the interpersonal quality of these items in the CDAP-Frost subscale that influence its positive association with the PCP-Sport subscale of the Sport-MPS-2. Due to the speculative nature of this argument, future research should examine the degree to which the interpersonal qualities represented in concern over mistakes and doubts about actions match those represented in perceived coach pressure.

The perceived parental pressure subscales of the Frost-MPS and Sport-MPS-2 are also viewed as interpersonal components of perfectionism (Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Frost et al., 1990). Items in these subscales assess individuals' tendencies to perceive their parents as sources of social pressure pertaining to the individuals' performance standards and achievements. It would therefore seem reasonable to expect a meaningful relationship between these two subscales and the PCP-Sport subscale. However, only a very small positive correlation was obtained between PCP-Sport and PPP-Frost (r = .15) and the correlation between PCP-Sport and PPP-Sport was not significant (r = .14). Thus, although PCP-Sport and PPP-Sport both measure

interpersonal aspects of perfectionism, it is clear that the current sample of male ice hockey players differentiated between social pressures that they perceived from coaches and parents.

Numerous researchers have argued that these coach- and parent-based perceptions should be recognized and differentiated in studies that examine the interpersonal aspects of perfectionism in sport (see Anshel & Eom, 2003; Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Dunn, Gotwals, et al., 2006; Flett & Hewitt, 2005; Gotwals et al., 2003). Along these same lines, a potential dimension of interpersonal perfectionism within the sport context that is not assessed by the Sport-MPS-2 involves athletes' perceptions of their teammates as sources of social pressure. Therefore, future research may wish to investigate the value of distinguishing between athletes' perceptions of parents, coaches, and teammates as potential sources of socially-based pressure when examining interpersonal perfectionism within sport contexts (see Dunn, Causgrove Dunn, et al., 2006 for a related discussion).

This study also conducted an exploratory factor analysis of the correlations among the subscales of the Sport-MPS-2 and the Frost-MPS as part of the construct validation process. In accordance with theoretical expectations, this analysis produced two factors that captured the hierarchical structure of the two instruments' subscales (see Table 7-10). The COM-Sport, DAA-Sport, PPP-Sport, PCP-Sport, CDAP-Frost, and PPP-Frost subscales loaded most strongly on the first factor that was labeled *Maladaptive Evaluation Concerns*. The PS-Sport, ORG-Sport, PS-Frost, and ORG-Frost subscales loaded most strongly on the second factor that was labeled *Positive Striving*. These labels were utilized by Frost et al. (1993) to describe similar factors produced in a study that

examined the hierarchical organization of Frost-MPS and Hewitt-MPS subscales.

The composition of the maladaptive evaluation concerns and positive striving factors are quite similar to factors produced in other factor analytic studies involving the Frost-MPS (Bieling et al., 2004; Cox et al., 2002; Frost et al., 1993; Stumpf & Parker, 2000). For example, both Bieling et al. and Cox et al. used confirmatory factor analytic procedures to examine the higher-order factor structure of Frost-MPS and Hewitt-MPS subscales. Both studies found good fitting models that reflected positive striving and maladaptive evaluation concerns factors. Indeed, a growing body of research has shown that maladaptive evaluation concerns and positive striving (as represented by Frost-MPS subscales) are linked to maladaptive and adaptive functioning, respectively (for a review, see Stoeber & Otto, in press). For example, maladaptive evaluation concerns has been associated with neuroticism (Stumpf & Parker), distress (Dunkley, Blankstein, Halsall, Williams, & Winkworth, 2000), and dysfunctional coping styles (Dunkley, Zuroff, & Blankstein, 2003). In contrast, positive striving has been associated with conscientiousness (Stumpf & Parker), positive affect (Frost et al.), and adaptive coping styles (Dunkley et al., 2003). It would appear that there are functional benefits associated with the setting of high personal standards when combined with high levels of organization and planning. Overall, the degree of theoretical convergence (Campbell & Fiske, 1959) between the Sport-MPS-2 and the Frost-MPS subscales provide initial external validity evidence supporting the use of Sport-MPS-2 assessments for inferential purposes. Similar to the Frost-MPS, the Hewitt-MPS is a widely utilized measure of perfectionism (Enns & Cox, 2002). Therefore, further external validity evidence for the Sport-MPS-2 could be produced through investigations of the relationships between the

Sport-MPS-2 and Hewitt-MPS subscales.

Additional external validity evidence supporting the use of the Sport-MPS-2 as a measure of perfectionism in sport can be obtained by examining the degree to which the Sport-MPS-2 subscales relate in theoretically meaningful ways to other constructs. To this end, the link between adaptive and maladaptive forms of perfectionism and competitive trait anxiety (CTA) was studied. It was hypothesized that adaptive perfectionists would have lower levels of CTA than maladaptive perfectionist athletes because (according to theory) adaptive perfectionists do not worry as much as maladaptive perfectionists about performance failure and negative social evaluation threats in competitive achievement contexts (see Burns, 1980; Hamachek, 1978; Missildine, 1963).

Parker's (1997) cluster analytic protocol was used in an attempt to identify profiles of adaptive and maladaptive perfectionism using scores on the six subscales of the Sport-MPS-2 (see Table 7-12). On average, individuals in the maladaptive perfectionism cluster had significantly higher scores on the PS-Sport, COM-Sport, PPP-Sport, PCP-Sport, and DAA-Sport subscales than individuals in the adaptive perfectionism cluster. The perfectionism literature is generally in agreement that high levels of concern over mistakes, perceived coach and parental pressure, and doubts about actions are associated with maladaptive functioning (see Dunn, Gotwals, et al., 2006; Enns & Cox, 2002). In accordance with theoretical expectations, maladaptive perfectionists reported significantly higher levels of somatic trait anxiety, cognitive trait anxiety (i.e., worry), and concentration disruption than adaptive perfectionists (see Table 7-13). In general, high levels of these CTA components (and the corresponding levels of

state anxiety) are expected to have debilitative effects on performance in sport (Martens et al., 1990; Smith & Smoll, 1990). These results support the use of the Sport-MPS-2 as an instrument that can be used to make inferences about adaptive and maladaptive perfectionist orientations of athletes in the competitive sport environment. This type of construct validity evidence is essential for researchers who are considering the use of the Sport-MPS-2 for the purpose of assessing perfectionist orientations in sport.

A counter-argument to this claim, however, could be conceptually grounded in the contention that the functional nature of CTA in sport is unclear. That is, while many sport psychologists associate high levels of CTA with inhibited athletic performance (e.g., Martens et al., 1990; Smith & Smoll, 1990), other sport psychologists (e.g., Burton & Naylor, 1997; Hardy, 1997; Jones & Swain, 1995) claim that anxiety can have facilitative effects upon performance in sport. The argument follows that if it is unclear whether anxiety is debilitative or facilitative towards sport performance, how can anxiety be used to differentiate between maladaptive or adaptive forms of perfectionism?

In the context of the present study, an answer to this question may be found in the differences between the three perfectionism clusters' scores on the concentration disruption subscale of the SAS. As indicated in Table 7-13, the adaptive perfectionism cluster (i.e., Cluster 3) reported significantly lower concentration disruption mean scores than both the maladaptive perfectionism cluster (i.e., Cluster 2) and the non-perfectionism cluster (i.e., Cluster 1). The items in the concentration disruption subscale reflect tendencies to lose appropriate task-relevant focus during sport competition. Nideffer (1989) clearly identified the debilitative nature of such tendencies by stating that "for any [athletes] to perform up to their potential, their attention must be focused on the

most salient or task relevant cues" (p. 118). Smith et al. (1990) produced empirical evidence supporting Nideffer's position when they examined differences in SAS concentration disruption scores across college football players whose performances in games across a season had been rated by coaches. Smith et al. reported that the best performing athletes ($n = 24$) had significantly lower concentration disruption scores than the worst performing athletes ($n = 24$), and concluded that concentration disruption scores were extremely valuable in differentiating between performance levels of athletes. Other research with 196 youth female volleyball players (Voight, Callaghan, & Ryska, 2000) found that the concentration disruption subscale of the SAS was negatively correlated with trait sport confidence ($r = -.38$, $p < .001$) and task orientation ($r = -.29$, $p < .01$). This pattern of correlations again indicates the dysfunctional nature of heightened concentration disruption levels in sport.

Given the debilitative nature of heightened concentration disruption levels in sport (see Moran, 1996; Nideffer, 1989; Smith et al., 1990), the differences observed between concentration disruption scores among the current clusters supports the maladaptive and adaptive perfectionism labels that were assigned to Clusters 2 and 3, respectively. The difference in competitive trait anxiety subscale scores between these two clusters lends construct validity evidence in support of the Sport-MPS-2 as an instrument that can distinguish between adaptive and maladaptive forms of perfectionism in sport.

Further support towards the validity of labeling Cluster 3 as adaptive perfectionism can be seen through a comparison of the pattern of this cluster's Sport-MPS-2 mean subscales scores and the pattern of Frost-MPS subscale scores obtained by Gould et al. (2002) with a sample of 10 U.S. Winter Olympic gold medalists. Similar to

the present profile of adaptive perfectionism exhibited in Cluster 3, the athletes in Gould et al.'s study "scored moderately high or high on [the] personal standards and organization [Frost-MPS subscales], but low on [the] concern over mistakes, parental expectations, parental criticism, and doubts about actions [Frost-MPS subscales]" (p. 198). This pattern of Frost-MPS subscale scores is also very similar to the perfectionism profiles displayed by adaptive perfectionists in studies that have cluster analyzed samples' Frost-MPS responses (e.g., Parker, 1997; Rice & Dellwo, 2002; Rice et al., 2003; Rice & Lapsley, 2001; Rice & Mirzadeh, 2000). This type of convergent validity evidence supports the use of the Sport-MPS-2 for the purpose of assessing perfectionist orientations in sport.

The cluster analytic profiles and corresponding between-group differences across perfectionism and CTA subscales reinforce the need for sport psychology researchers to consider the adaptive versus maladaptive nature of perfectionism in sport. Interestingly, Flett and Hewitt (2002) have questioned whether these clusters of so-called adaptive and maladaptive perfectionists "differ in *degrees* of perfectionism…[or whether they differ] in *kinds* of perfectionism" (Flett & Hewitt; p. 18; italics in original). In other words, Flett and Hewitt question whether these groups (and their associated perfectionist profiles) represent different points along a perfectionism continuum or whether they represent qualitatively different *types* of perfectionism. The former perspective would represent a *dimensional* view of perfectionism, while the latter perspective would represent a *categorical* view of perfectionism.

Rank ordering of clusters across each dimension of perfectionism can be used to determine whether cluster analytic results support a dimensional or categorical view of

perfectionism. A dimensional view of perfectionism would be represented by clusters in which the mean subscale scores in each cluster were rank ordered in terms of magnitude. For example, Cluster A might have the lowest scores on all perfectionism subscales, Cluster B may have moderate scores across all subscales, and Cluster C may have the highest scores across all subscales (see Vallance, Dunn, & Causgrove Dunn, in press). In contrast, a categorical view of perfectionism would be supported if the rank order of each subscale mean differed between Clusters A, B, and C—as was the case in the present study. Specifically, as seen in Table 7-12, the maladaptive perfectionists (i.e., Cluster 2) had significantly higher scores on five of the six Sport-MPS-2 subscales in comparison to the adaptive perfectionists (i.e., Cluster 3). However, the maladaptive perfectionists and adaptive perfectionists had similar high ORG-Sport scores. Moreover, the adaptive perfectionists had significantly higher PS-Sport and ORG-Sport scores than the non-perfectionists (i.e., Cluster 1), but significantly lower COM-Sport, PCP-Sport, and DAA-Sport scores than the non-perfectionists. Thus, the present results appear to support a categorical view of perfectionism that represents qualitatively different types of perfectionist orientations in sport. Clearly more research using the Sport-MPS-2 as a measure of perfectionism in sport is required to further investigate this issue.

Overall, the results of this study represent encouraging external validity evidence supporting the inclusion of the newly created DAA-Sport and ORG-Sport subscales in the Sport-MPS-2. Both subscales were correlated in theoretically meaningful ways with conceptually analogous Frost-MPS subscales (see Table 7-8) and both subscales were useful in distinguishing between different perfectionism profiles in the cluster analysis (see Table 7-12). Given that doubts about actions and organization are believed to

represent core components of perfectionism (Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963), the results of this study indicate that the inclusion of these subscales in the Sport-MPS-2 may help sport psychology researchers to further their understanding of perfectionism in athletes. Clearly more construct validation work with independent samples of athletes who differ in terms of their age, competitive levels, and sport-types is required before the full benefits of including DAA-Sport and ORG-Sport in the Sport-MPS-2 can be fully determined. Nevertheless, results of this study in conjunction with the results from the previous chapters provide a strong starting point from which future studies of perfectionism in sport can be built.

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Chapter 8

General Discussion

This dissertation presented the initial phases of the construct validation process surrounding the development of the *Sport Multidimensional Perfectionism Scale 2* (Sport-MPS-2). The Sport-MPS-2 includes two new subscales that have been added to the original *Sport Multidimensional Perfectionism Scale* (Sport-MPS) as developed by Dunn, Causgrove Dunn, and Syrotuik (2002). Although a considerable amount of validity evidence has been produced to support the use of the Sport-MPS as a measure of perfectionism in sport (e.g., Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002; Dunn, Gotwals, Causgrove Dunn, & Syrotuik, 2006), it was argued in earlier chapters that the original Sport-MPS may under-represent perfectionism in sport. Specifically, the Sport-MPS does not contain items designed to assess two core characteristics expressed in Hamachek's (1978) conceptualization of perfectionism— namely, the characteristics represented by the doubts about actions and organization dimensions of perfectionism (cf. Frost, Marten, Lahart, & Rosenblate, 1990). Therefore, to alleviate this concern, this dissertation attempted to (a) develop sport-based doubts about actions and organization items to be included in the Sport-MPS-2 and (b) provide an evidential-basis to support the use of the new items and the Sport-MPS-2 for the purposes of assessing perfectionistic tendencies in the domain of sport.

Messick's (1989) unified conceptualization of validity provided the framework around which efforts to achieve these goals were organized. Specifically, a series of phases were presented that focused on the production of different types of validity evidence that Messick deemed important to the validation process. The initial phases

focused on establishing internal validity evidence for sets of items that had been developed to assess doubts about actions and organization in sport (DAA-Sport and ORG-Sport, respectively). The first phase of the dissertation (see Chapters 2 and 3) chronicled the development of domain specifications that captured the domain-specific nature of these new subscales. These domain specifications were based on perfectionism theorists' (e.g., Burns, 1980; Hamachek, 1978; Hollender, 1965; Missildine, 1963) original conceptualizations of perfectionism as well as self-described perfectionists' and identified maladaptive and adaptive perfectionists' descriptions of their own achievement orientations (e.g., Rice, Bair, Castro, Cohen, & Hood, 2003; Slaney & Ashby, 1996; Slaney, Chadha, Mobley, & Kennedy, 2000). These conceptualizations and self-descriptions were then applied to the sport domain.

In the second phase of this dissertation (see Chapter 4) two sets of items were constructed to represent the domain specifications of doubts about actions and organization (i.e., DAA-Sport and ORG-Sport). Content-related validity evidence was then established for DAA-Sport and ORG-Sport in the form of expert judges' ratings of item content relevance and item-set content representativeness (see Messick, 1989). Specifically, expert judges rated the degree to which (a) each of the new DAA-Sport and ORG-Sport items was relevant to its intended domain, and (b) each item-set adequately covered its intended domain. Quantitative and qualitative analyses of the judges' ratings indicated that DAA-Sport and ORG-Sport items possessed adequate levels of content relevance and content representativeness.

The third phase of this dissertation (as presented in Chapter 5) established structurally-related validity evidence for the DAA-Sport and ORG-Sport subscales.

Specifically, this phase utilized multidimensional scaling (MDS) to examine (a) the latent structure of DAA-Sport and ORG-Sport items, and (b) how this latent structure fit within the pre-existing structure of the original Sport-MPS (cf. Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002). An initial MDS analysis involving only DAA-Sport and ORG-Sport items indicated clear distinctions between items intended to measure each of these dimensions. In addition, results suggested the possibility that both DAA-Sport and ORG-Sport were multidimensional in nature. Two additional MDS analyses involving DAA-Sport and ORG-Sport item subsets with marker items from each of the four original Sport-MPS subscales (i.e., Personal Standards [PS-Sport], Concern Over Mistakes [COM-Sport], Perceived Parental Pressure [PPP-Sport], and Perceived Coach Pressure [PCP-Sport]) indicated the unique nature of both the DAA-Sport and ORG-Sport items within the context of the original Sport-MPS items. In other words, the MDS analyses suggested that the latent structure of the Sport-MPS-2 would be best captured by six identifiable perfectionism dimensions: namely, PS-Sport, COM-Sport, PPP-Sport, PCP-Sport, DAA-Sport, and ORG-Sport.

The fourth phase of this dissertation (as presented in Chapter 6) established structurally-related validity evidence for the Sport-MPS-2 through factor analytic procedures. The results of these factor analyses converged with the results of two of the MDS analyses indicating that the latent dimensionality of the entire set of Sport-MPS-2 items was best represented by six factors (i.e., PS-Sport, COM-Sport, PPP-Sport, PCP-Sport, DAA-Sport, and ORG-Sport). However, despite this impressive internal validity evidence, Messick (1989) noted that a test's external relationships with other criteria (or constructs) must be established before test users can feel confident in making inferences

and decisions on the basis of test scores. Consequently, the final phase of this dissertation (as presented in Chapter 7) examined relationships between scores on the Sport-MPS-2 and scores provided by another measure of perfectionistic tendencies—namely, the *Multidimensional Perfectionism Scale* (Frost-MPS: Frost et al., 1990)—and scores provided by a measure of competitive trait anxiety—namely, the *Sport Anxiety Scale* (SAS: Smith, Smoll, & Schutz, 1990).

Bivariate correlation analyses, multiple regression analyses, and a factor analysis indicated that the Sport-MPS-2 subscales were related in theoretically meaningful ways to conceptually analogous subscales of the Frost-MPS. Moreover, cluster analytic procedures suggested that, in accordance with theory, the six subscales of the Sport-MPS-2 can be used to identify profiles of adaptive and maladaptive perfectionism in sport (Hamachek, 1978; Parker, 1997). Given the heated debate among theorists as to whether perfectionism has the potential for both adaptive and maladaptive functioning (see Flett & Hewitt, 2005; Greenspan, 2000; Stoeber & Otto, in press), these findings suggest that the Sport-MPS-2 may be a valuable tool that can be used to address issues surrounding this debate in sport.

One such issue involves whether Hamachek's (1978) conceptualization of adaptive perfectionism can be differentiated from other positive achievement motivation constructs, such as Nicholls's (1989) task achievement goal orientation (see Hall, 2005). Achievement goal orientation refers to individuals' dispositional tendencies to strive for specific goals in achievement contexts (Nicholls). These goals illuminate individuals' subjective definitions of personal competence and success in regards to their performance in achievement contexts (Duda & Hall, 2001). Task achievement goal-oriented

individuals define personal success and competence through the use of self-referent standards (Duda, 1993). That is, these individuals gauge their level of competence in a given activity through standards such as skill improvement, hard work, and active engagement (Duda).

A comparison between this conceptualization of task-oriented individuals (Duda, 1993; Nicholls, 1989) and Hamachek's (1978) conceptualization of adaptive perfectionists reveals several parallels between the two achievement motivation orientations. For example, both task-oriented individuals and adaptive perfectionists use self-referenced standards to judge success, put forth maximum effort to achieve their goals, and feel satisfaction and enjoyment as a result of putting forth such efforts. According to theory, however, task-oriented individuals and adaptive perfectionists can be differentiated in regards to the ultimate goals of their achievement efforts. While the goals of task-oriented individuals revolve around putting in hard work to achieve personal improvement (Duda), the goal that adaptive perfectionists pursue in personally relevant activities is to achieve perfect performance (Hamachek). Additionally, adaptive perfectionists' desire for efficiency, order, and organization in their achievement efforts is not considered to be a core component of task-oriented individuals' achievement orientations.

Research in sport (Dunn et al., 2002; Hall, Kerr, & Matthews, 1998) has indicated a relationship between task orientation and adaptive perfectionism. For example, Hall et al. used canonical correlation to analyze obtained from a sample of high school cross-country runners ($n = 119$) and found a statistically significant relationship ($R_C = .37, p < .001$) between strong task orientations and low scores on the concern over mistakes and

parental criticism subscales of the Frost-MPS. As indicated in Chapter 7, low scores on these subscales have been repeatedly identified as components within profiles of adaptive perfectionism (Stoeber & Otto, in press). Dunn et al. expanded upon Hall et al.'s results by using the Sport-MPS as the measure of perfectionism among a sample of male high school Canadian football players (n = 174). Again through the use of canonical correlation, Dunn et al. found a statistically significant relationship (R_C = .36, p < .005) between a strong task orientation and a pattern of scores across the Sport-MPS subscales that corresponded to Hamachek's conceptualization of adaptive perfectionism (i.e., high levels of PS-Sport combined with low levels of COM-Sport, PPP-Sport, and PCP-Sport).

The theoretical similarities between adaptive perfectionism and a task orientation (Hamachek, 1978; Nicholls, 1989), as evidenced empirically through Hall et al.'s (1998) and Dunn et al.'s (2002) canonical correlation results, indicate that the two achievement motivation constructs share a degree of similarity. Hall (2005) speculated that the two constructs were synonymous and that it may cause less confusion within the perfectionism literature if researchers in sport psychology referred solely to task orientations rather than adaptive perfectionism. This argument is based around the view that the term "perfectionism" should be primarily utilized to refer to maladaptive perfectionism (Stoeber & Otto, in press). To examine the validity of Hall's claim, future research should compare whether adaptive perfectionism (as conceptualized by Hamachek and assessed by Parker's [1997] cluster analytic protocol) can predict variance in cognition, affect, and behavior above and beyond that predicted by task orientation. The degree to which the Sport-MPS-2 could be of assistance in such research would be an important indicator of the validity of the instrument's assessments (Messick, 1989).

The validation efforts presented in this dissertation were based on the contention that, with the addition of new items designed to assess doubts about actions and organization, the Sport-MPS-2 would provide more representative assessments of sport-based perfectionism than its predecessor (i.e., the Sport-MPS). The truth of this contention rests upon the claim that doubts about actions and organization (as defined in this dissertation) represent core components of perfectionism in sport—a claim that some researchers have recently questioned (e.g., Anshel & Eom, 2003; Rhéaume, Freeston, Dugas, Letarte, & Ladoceur, 1995; Shafran, Cooper, & Fairburn, 2002; Stoeber & Otto, in press). For example, in the sport psychology literature, Anshel and Eom stated that doubts about actions and organization "do not appear to be associated with sport participation" (p. 267) because the two dimensions were not represented in their sport-based perfectionism instrument. However, such a statement seems unjustified given that Anshel and Eom did not include items designed to assess organization among the initial pool of items they generated for inclusion in their instrument, and they deleted items from this pool that were designed to assess doubts about actions due to simple structure problems following factor analyses of their data.

Questions regarding whether doubts about actions and organization represent central components of perfectionism also extend to the general psychology literature. For example, Rhéaume et al. (1995) and Shafran et al. (2002) described doubts about actions as a correlate of perfectionism rather than a core component of the construct. A counter argument against this position was presented in Chapters 1 and 3 through references to theorists' (e.g., Burns, 1980; Hamachek, 1978; Missildine, 1963) identification of the perfectionistic tendency to struggle to determine when adequate levels of personal

performance have been achieved. This description of perfectionistic behavior was also supported through Rice et al.'s (2003) qualitative investigation of how maladaptive, adaptive, and non-perfectionistic individuals conceptualize the personality trait. Specifically, in Rice et al.'s study, two adaptive perfectionists, four maladaptive perfectionists, and three non-perfectionists characterized perfectionistic behavior as being chronically dissatisfied with personal performance levels. Although more discussion among perfectionism theorists around the nature of doubts about actions as a core component of perfectionism is likely to continue, doubts about actions has played a central role in perfectionism research for the past 16 years (e.g., Coen & Ogles, 1993; Enns, Cox, & Clara, 2005; Gotwals, Dunn, & Wayment, 2003; Kittler, Adkins, & Parker, 1996). As a result, its inclusion as a dimension in the Sport-MPS-2 seems warranted at this time.

Similar to Rhéaume et al.'s (1995) and Shafran et al.'s (2002) concerns regarding doubts about actions, Stoeber and Otto (in press) have recently questioned the necessity of assessing organization when examining the functional nature of perfectionism. To justify this claim Stoeber and Otto pointed out that measures of organization have had low to moderate correlations with measures of personal standards, total perfectionism scores, and factors representing adaptive components of perfectionism (cf. Frost et al., 1990; Rice, Lopez, & Vergara, 2005; Slaney, Rice, Mobley, Trippi, & Ashby, 2001). However, as argued in Chapter 1, given that perfectionism is considered to be a multidimensional construct comprised of unique components (Flett & Hewitt, 2002), these correlational results do not necessarily indicate that organization should be excluded from perfectionism assessments.

It should also be noted that the DAA-Sport and ORG-Sport subscales of the Sport-MPS-2 appear to share conceptual similarities with subscales contained in a new measure of global perfectionism developed by Hill et al. (2004) that has been titled, the *Perfectionism Inventory* (PI). Based on a review of current perfectionism measures, Hill et al. developed two subscales for the PI that they labeled *Rumination* and *Planfulness*. The rumination subscale of the PI represents the "tendency to obsessively worry about past errors, less than perfect performance, or future mistakes" (Hill et al., p. 83). This content is similar to DAA-Sport's representation of athletes' tendencies to be uncertain about, or dissatisfied with, the quality of their pre-performance training (see operational definition in Chapter 3). The planfulness subscale of the PI represents the "tendency to plan ahead and to deliberate over decisions" (Hill et al., p. 83). This content is similar to ORG-Sport's representation of athletes' tendencies to establish and implement plans to govern their pre- and within-performance behavior (see operational definition in Chapter 2). The similarities between the rumination and planfulness subscales of the PI and the DAA-Sport and ORG-Sport subscales, respectively, provide further evidence that perfectionism researchers are not willing to abandon aspects of doubts about actions and organization from their conceptualizations of perfectionism. Future research examining the correlations between DAA-Sport and ORG-Sport and the two subscales of the PI would seem like an appropriate step in the construct validation process surrounding the Sport-MPS-2.

Interestingly, perfectionism researchers have not focused solely upon doubts about actions and organization as examples of dimensions that may not represent core components of perfectionism. For example, similar questions (see Flett & Hewitt, 2002;

Rhéaume et al., 1995; Stoeber & Otto, in press) have been directed at the constructs represented by the socially prescribed perfectionism and other-oriented perfectionism subscales of Hewitt and Flett's (1991) *Multidimensional Perfectionism Scale* (Hewitt-MPS), the discrepancy subscale in Slaney et al.'s (2001) *Revised Almost Perfect Scale*, and Terry-Short, Owens, Slade, and Dewey's (1995) *Positive and Negative Perfectionism Scale*. Collectively, along with the Frost-MPS, these instruments are used in the vast majority of studies that quantitatively measure perfectionism in the general psychology and sport psychology literatures (Enns & Cox, 2002; Haase, Prapavessis, & Owens, 1999; 2002). The fact that there is debate over the relevancy of constructs represented by all of these instruments highlights the problem of having no single definition of perfectionism that is agreed upon by perfectionism researchers and theorists (Flett & Hewitt, 2002).

One potential explanation as to why there is such disagreement over the most appropriate way to conceptualize perfectionism may be grounded in the fact that "the defining features of perfectionism have been overly reliant upon the clinical perspectives of theorists, practitioners, and researchers" (Rice et al., 2003, p. 41). Rice et al. argued that perfectionism theorists and researchers have become overly reliant on these clinical perspectives while failing to examine the self-descriptions of self-professed adaptive and maladaptive perfectionists. To this end, Rice et al. called for research that utilizes qualitative methodologies to investigate the core components of perfectionism.

To date, no studies in the sport psychology literature have utilized qualitative protocols to examine how perfectionism is conceptualized and experienced from the athletes' perspectives. This would appear to be a highly fruitful line of research to pursue

in the sport psychology literature given the number of self-professed perfectionists who report their perfectionistic tendencies in elite and professional sport contexts (e.g., four-time NASCAR Cup Series champion Jeff Gordon [Beech, 2003], PGA golfer and 2003 Masters champion Mike Weir [Korobanik, 2003], NFL kicker Mike Vanderjagt [Associated Press, 2003], and NFL Pro Bowl quarterback Carson Palmer [Hobson, 2005]). Understanding the core aspects of these elite and professional athletes' perfectionist tendencies would also help shed light on the adaptive versus maladaptive nature of perfectionism in sport. It would seem counterintuitive to argue that perfectionist orientations in sport are solely maladaptive if elite and professional athletes are experiencing prolonged success at the high performance level. A multi-method approach that employs quantitative assessments of perfectionism with the Sport-MPS-2 and qualitative interviews with athletes may provide a meaningful approach to understanding perfectionism in sport.

Messick (1989) indicated that determining the validity of a test score inference is a continual and evolving process. Therefore, full evaluation of the validity of Sport-MPS-2 assessments as representations of perfectionistic orientations specific to sport must be considered an on-going process subject to the results of future perfectionism research and advances in perfectionism theory. For example, given that perfectionism is conceptualized as a personality trait (Flett & Hewitt, 2002), valuable validity evidence could be produced through investigations of the test-retest reliability of the Sport-MPS-2. As initial steps in the validity process, though, the internal and external validity evidence presented through the five phases of this dissertation provide strong support for the interpretability, relevance, and predictive utility of DAA-Sport, ORG-Sport, and Sport-

MPS-2 assessments. Indeed, it could be suggested that this body of evidence establishes the Sport-MPS-2 as a more appropriate measure of sport-based perfectionism than both the Frost-MPS and the Hewitt-MPS.

Although this claim may appear to be somewhat premature, a comparison of the structurally-related validity evidence pertaining to the Sport-MPS-2, the Frost-MPS, and the Hewitt-MPS strengthens this argument. For example, the evidence presented in Chapters 5, 6, and 7 indicated that the latent dimensionality of the Sport-MPS-2 is robust and stable across independent samples (although it must be acknowledged that there is some instability of item loadings across factors between samples).[1] The cross-sample stability of the PS-Sport, COM-Sport, PCP-Sport, and PPP-Sport factors of the Sport-MPS-2 is further reinforced when taken in conjunction with the factor analytic evidence supporting the four-dimensional structure of the original Sport-MPS (see Dunn, Causgrove Dunn, et al., 2006; Dunn et al., 2002).

In contrast to the Sport-MPS-2, as indicated in the introductory chapter of this dissertation, both the Frost-MPS and the Hewitt-MPS can be criticized (from a psychometric perspective) on the basis that there is little evidence supporting the stability of the factorial composition and factor structure of both instruments across independent samples. For example, Frost et al.'s (1990) proposed six-factor solution for the Frost-MPS has repeatedly not been supported by subsequent independent exploratory factor analytic examinations of the instrument (see Cheng, Chong, & Wong, 1999; Cox, Enns, & Clara, 2002; Harvey, Pallant, & Harvey, 2004; Khawaja & Armstrong; 2005; Purdon, Antony, & Swinson, 1999; Stöber, 1998; Stumpf & Parker, 2000). The latent

[1] It is important to note that although the specific pattern of meaningful loadings pertaining to a few individual Sport-MPS-2 items differed across independent samples, the interpretation of the six Sport-MPS-2 factors remained the same across all samples.

dimensionality of the Hewitt-MPS has been examined to a much lesser degree than that of the Frost-MPS, yet the results of one study that has conducted such an investigation (i.e., Cox et al.) did not supported the instrument's latent dimensionality as proposed by Hewitt and Flett (1991). It is also worth reiterating that, in their respective instrument development studies, both Frost et al. and Hewitt and Flett did not report sufficient information pertaining to the initial factor analytic examinations of their respective instruments.

In the face of this evidence, though, the multitude of research studies that have utilized the Frost-MPS and the Hewitt-MPS to measure perfectionism (Enns & Cox, 2002) have scored the instruments in accordance with the original factorial compositions and factor structures proposed respectively by Frost et al. (1990) and Hewitt and Flett (1991). Perhaps these studies singularly relied on estimates of subscale internal consistency (such as coefficient alpha) to evaluate whether the proposed subscale structure of the respective perfectionism instrument was applicable within the sample at hand. However, as well documented in the literature, a set of items can display a relatively high degree of internal consistency yet be multidimensional in nature (Green, Lissitz, & Mulaik, 1977; see Cortina, 1993, for a related discussion). Therefore, within these perfectionism studies it is possible that the proposed scoring model for the Frost-MPS and/or the Hewitt-MPS was not appropriate for the sample at hand even though the subscales of the respective instrument may have demonstrated a high degree of internal consistency. Perhaps even more alarming is the fact that many of the sport psychology studies that have utilized the Frost-MPS (i.e., Coen & Ogles, 1993, Frost & Henderson, 1990; Gould, Dieffenbach, & Moffet, 2002; Gould, Udry, Tuffey, & Loehr, 1996;

Koivula, Hassmén, & Fallby, 2002) have not even reported internal consistency estimates for each of the instrument's subscales within their specific samples, but have instead relied on the estimates reported by Frost et al. in their original scale development paper. Given that a large amount of current perfectionism theory has been based upon the findings from studies that have utilized the Frost-MPS and the Hewitt-MPS, it is recommended that much more attention be paid to the latent dimensionality of each instrument before more confidence can be placed in the inferences that are based upon these instruments' assessments.

The argument that the Sport-MPS-2 may be a better measure of perfectionism in sport over the Frost-MPS and Hewitt-MPS is also grounded within the domain-specific view of perfectionism. As noted in previous chapters, the Frost-MPS and the Hewitt-MPS were designed to provide assessments of global levels of perfectionism yet there is theoretical and empirical evidence supporting a domain-specific view of perfectionistic tendencies (Dunn et al., 2005; Missildine, 1963; Mitchelson & Burns, 1998; Shafran et al., 2002). Therefore, a critical step in the validation process supporting the use of the Sport-MPS-2 over the Frost-MPS or the Hewitt-MPS to assess perfectionism in sport would be to compare the predictive utility of all three instruments in a sport setting.

Numerous perfectionism theorists (e.g., Dunn, Gotwals, & Causgrove Dunn, 2005; Flett & Hewitt, 2002; 2005; Rice & Mirzadeh, 2000; Slaney, Rice, & Ashby, 2002) have requested comparisons between domain-specific perfectionism instruments (such as the Sport-MPS-2) and global perfectionism instruments (such as the Frost-MPS and the Hewitt-MPS) because the results of such comparisons would serve to guide the best way to assess perfectionism in different specific achievement domains. For example, research

in the field of anxiety has clearly demonstrated that domain-specific measures of anxiety (e.g., competitive anxiety, test anxiety, physique anxiety) are better able to predict within-domain cognition, affect, and behavior than global measures of anxiety thereby advancing the understanding of anxiety within these specific domains (see Smith et al., 1990, for a related discussion). Examination of this topic within sport contexts is important given that most sport psychology perfectionism research has utilized global perfectionism instruments to measure the trait (e.g., Coen & Ogles, 1993; Frost & Henderson, 1991; Gotwals et al., 2003; Gould et al., 2002; Gould et al., 1996; Haase et al., 1999; 2002; Hall et al., 1998; Koivula et al., 2002).

Given that the Sport-MPS-2 is an expanded version of Dunn et al.'s (2002) original Sport-MPS, researchers may want to base such comparisons of the predictive utility of the Sport-MPS-2, Frost-MPS, and/or Hewitt-MPS upon constructs that have been included in studies that utilized the original Sport-MPS. For example, the original Sport-MPS has been used to explore the relationships between sport-based perfectionism and sport achievement motivation orientations (Dunn et al., 2002), trait anger (Dunn, Gotwals, et al., 2006), situational anger (Vallance, Dunn, & Causgrove Dunn, in press), body image (Dunham, 2002), and self-acceptance (Dunn & Gotwals, 2005). Such a strategy would serve to provide evidence as to the benefits of utilizing domain-specific versus global measures of perfectionism, but would also indicate whether the Sport-MPS-2 can provide information beyond that provided by the original Sport-MPS. Such comparative research would not only provide important validity evidence for Sport-MPS-2 assessments, but would also serve to advance perfectionism theory and research in general (Messick, 1989).

In conclusion, Messick (1989) indicated that a key issue pertaining to the validity process is evaluation of "the functional worth of [test] scores in terms of social consequences of their use" (1989, p. 13). Therefore, an important test of the validity of the Sport-MPS-2 as a measure of perfectionistic orientations in sport rests upon whether it can be used to further applied sport psychologists' and coaches' efforts to manage athletes' perfectionistic orientations. That is, the functional worth of the Sport-MPS-2 would be demonstrated if the accumulated results of its use in future research could be used to help athletes reap the benefits of adopting adaptive perfectionist orientations in sport while avoiding the disastrous and debilitating pitfalls associated with maladaptive perfectionism. While the validation process surrounding the Sport-MPS-2 must still be regarded in its infancy, the validation efforts presented in this dissertation provide a very solid foundation upon which future research efforts involving the Sport-MPS-2 can be based.

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Appendix A

Version of the Frost-MPS Used in Chapter 3

INSTRUCTIONS: The purpose of this questionnaire is to identify how undergraduate students view certain aspects of their achievement at school. Please help us to more fully understand this concept by indicating the extent to which you agree or disagree with the following statements. Please circle one response option to the right of each statement (do not circle between response options). There are no right or wrong answers so please don't spend too much time on any one statement; simply choose the answer that best describes how you view each statement.

To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. My parents set very high standards for me in school.	SD	D	NA	A	SA
2. When I study I usually examine a certain topic over and over again because I am uncertain whether I have learned the material well enough.	SD	D	NA	A	SA
3. In school, organization is very important to me.	SD	D	NA	A	SA
4. As a child, I was punished for doing things less than perfect at school.	SD	D	NA	A	SA
5. If I do not set the highest scholastic standards for myself, I am likely to end up a second rate person.	SD	D	NA	A	SA
6. I usually study for long periods of time because I do not feel that I satisfactorily understand the subject.	SD	D	NA	A	SA
7. My parents never tried to understand my mistakes at school.	SD	D	NA	A	SA
8. It is important to me that I be thoroughly competent in everything that I do at school.	SD	D	NA	A	SA
9. I try to be an organized student.	SD	D	NA	A	SA
10. I usually feel uncertain about whether or not I have adequately prepared for an exam.	SD	D	NA	A	SA
11. If I fail at school, I am a failure as a person.	SD	D	NA	A	SA
12. I should be upset if I make a mistake at school.	SD	D	NA	A	SA
13. I usually expend extra effort studying a certain topic because I am not sure if I understand the material well enough.	SD	D	NA	A	SA
14. My parents wanted me to be the best at everything in school.	SD	D	NA	A	SA
15. I set higher goals in school than most people.	SD	D	NA	A	SA
16. I rarely feel satisfied with my exam study habits.	SD	D	NA	A	SA
17. If someone does a task at school better than me, then I feel like I failed the whole task.	SD	D	NA	A	SA
18. If I fail partly at school, it is as bad as being a complete failure.	SD	D	NA	A	SA

Please complete the remaining items in this questionnaire on the next page. ☞

To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
19. Only outstanding scholastic performance is good enough in my family.	SD	D	NA	A	SA
20. I usually expend extra effort studying a certain topic because I am convinced that I do not satisfactorily understand the material.	SD	D	NA	A	SA
21. I am very good at focusing my efforts on attaining a goal in school.	SD	D	NA	A	SA
22. Even when I do something very carefully at school, I often feel that it is not quite right.	SD	D	NA	A	SA
23. I usually have trouble deciding when I have studied enough for an exam.	SD	D	NA	A	SA
24. I hate being less than the best at things at school.	SD	D	NA	A	SA
25. When I study I usually examine a certain topic over and over again because I'm convinced that I haven't learned the subject well enough.	SD	D	NA	A	SA
26. I have extremely high scholastic goals.	SD	D	NA	A	SA
27. My parents have expected excellence from me at school.	SD	D	NA	A	SA
28. People will probably think less of me if I make a mistake at school.	SD	D	NA	A	SA
29. I usually feel unsure about the adequacy of my exam study habits.	SD	D	NA	A	SA
30. At school I never felt like I could meet my parents' expectations.	SD	D	NA	A	SA
31. If I do not do as well as other people in school, it means I am an inferior human being.	SD	D	NA	A	SA
32. Other people seem to accept lower standards from themselves at school than I do.	SD	D	NA	A	SA
33. If I do not do well all the time at school, people will not respect me.	SD	D	NA	A	SA
34. I rarely feel fully prepared for an exam.	SD	D	NA	A	SA
35. My parents have always had higher expectations for my future in school than I have.	SD	D	NA	A	SA
36. I usually have doubts about the simple everyday things that I do at school.	SD	D	NA	A	SA
37. I expect higher performance in my daily scholastic tasks than most people.	SD	D	NA	A	SA
38. I usually study for long periods of time because I have doubts about whether or not I know the subject well enough.	SD	D	NA	A	SA

Please complete the remaining items in this questionnaire on the next page. ☞

To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
39. I am an organized student.	SD	D	NA	A	SA
40. I tend to get behind in my work at school because I repeat things over and over.	SD	D	NA	A	SA
41. It takes me a long time to do something "right" at school.	SD	D	NA	A	SA
42. The fewer mistakes I make at school, the more people will like me.	SD	D	NA	A	SA
43. At school I never felt like I could meet my parents' standards.	SD	D	NA	A	SA
44. I rarely feel that I have done sufficient studying in preparation for an exam.	SD	D	NA	A	SA

Please read and, if you agree to the terms presented, complete the consent form on the next page. ☞

Appendix B

Instrument Used to Assess Content Relevance

Please indicate the degree to which you feel **each** item listed below fits its intended dimension (**as defined on page 2**). Feel free to add any additional comments where necessary.

Item 1: I usually feel uncertain as to whether or not my training effectively prepares me for competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Doubts About Actions	☐	☐	☐	☐	☐

Comments:

Item 2: I usually feel unsure about the adequacy of my pre-competition practices.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Doubts About Actions	☐	☐	☐	☐	☐

Comments:

Item 3: I usually have trouble deciding when I have practiced enough heading into a competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Doubts About Actions	☐	☐	☐	☐	☐

Comments:

Item 4: Prior to competition, I rarely feel satisfied with my training.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Doubts About Actions	☐	☐	☐	☐	☐

Comments:

Please rate the items on the next page of this questionnaire. ☞

Item 5: I rarely feel that my training fully prepares me for competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Doubts About Actions	☐	☐	☐	☐	☐

Comments:

Item 6: I rarely feel that I have trained enough in preparation for a competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Doubts About Actions	☐	☐	☐	☐	☐

Comments:

Item 7: On the day of competition I have a routine that I try to follow.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Organization	☐	☐	☐	☐	☐

Comments:

Item 8: I have and follow a pre-competitive routine.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Organization	☐	☐	☐	☐	☐

Comments:

Please rate the items on the next page of this questionnaire. ☞

Item 9: I follow pre-planned steps to prepare myself for competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Organization	☐	☐	☐	☐	☐

Comments:

Item 10: I follow a routine to get myself into a good mindset going into competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Organization	☐	☐	☐	☐	☐

Comments:

Item 11: I develop plans that dictate how I want to perform during competition.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Organization	☐	☐	☐	☐	☐

Comments:

Item 12: I set plans that highlight the strategies I want to use when I compete.

Intended Domain	Poor Fit	Fair Fit	Good Fit	Very Good Fit	Excellent Fit
Organization	☐	☐	☐	☐	☐

Comments:

Appendix C

Item Content Relevance Assessment with Ratings from Judges 4, 6, and 7 Removed

The item content relevance dataset was analyzed with the ratings provided by Judges 4, 6, and 7 removed to examine whether these judges should be labeled as discrepant judges. With these judges' ratings removed, the mean and median item content relevance ratings for eleven of the twelve proposed items were ≥ 4.17 and ≥ 4.50 respectively (see Table C-1). The mean and median item content relevance rating for the remaining doubts about actions item (i.e., "Prior to competition, I rarely feel satisfied with my training") was 3.83 and 3.50 respectively. Additionally, the range statistics for all of the items (except the range statistic associated with the proposed doubts about actions item, "I usually feel uncertain as to whether or not my training effectively prepares me for competition") were ≤ 3. Finally, the *V* coefficients (Aiken, 1985) associated with eleven of the twelve items were statistically significant (see Table C-1). The only item that was associated with a non-significant *V* coefficient was the proposed doubts about actions item, "Prior to competition, I rarely feel satisfied with my training". Collectively, these results indicate that when the ratings provided by Judges 4, 6, and 7 were removed from the data set, the remaining six judges' ratings provided strong and unambiguous evidence that the content of each of the proposed items was judged to be very relevant to its intended domain.

Table C-1

Item Content Relevance Rating Descriptive Statistics With Data From Judges 4, 6, and 7 Removed

Item		Intended Domain	*M*	*SD*	*Mdn*	*Range*	Aiken's *V*
1.	I usually feel uncertain as to whether or not my training effectively prepares me for competition.	DAA	4.17	1.17	4.50	4.00	.79*
2.	I usually feel unsure about the adequacy of my pre-competition practices.	DAA	4.50	.55	4.50	2.00	.88**
3.	I usually have trouble deciding when I have practiced enough heading into a competition.	DAA	4.50	.84	5.00	3.00	.88**
4.	Prior to competition, I rarely feel satisfied with my training.	DAA	3.83	.98	3.50	3.00	.71
5.	I rarely feel that my training fully prepares me for competition.	DAA	4.83	.41	5.00	2.00	.96**
6.	I rarely feel that I have trained enough in preparation for a competition.	DAA	4.67	.82	5.00	3.00	.92**
7.	On the day of competition I have a routine that I try to follow.	ORG	4.83	.41	5.00	2.00	.96**
8.	I have and follow a pre-competitive routine.	ORG	4.83	.41	5.00	2.00	.96**
9.	I follow pre-planned steps to prepare myself for competition.	ORG	4.83	.41	5.00	2.00	.96**
10.	I follow a routine to get myself into a good mindset going into competition.	ORG	4.83	.41	5.00	2.00	.96**
11.	I develop plans that dictate how I want to perform during competition.	ORG	4.17	.98	4.50	3.00	.79*
12.	I set plans that highlight the strategies I want to use when I compete.	ORG	4.33	.82	4.50	3.00	.83*

Note. DAA = Doubts about actions. ORG = Organization.

* $p < .05$; ** $p < .01$.

These results also reveal that when the ratings provided by Judges 4, 6, and 7 were excluded from the dataset, stronger support for the content relevance of the 12 proposed items is produced. For example, when the ratings provided by Judges 4, 6, and 7 were removed from the analyses, each item had a higher *V* coefficient than it received when these judges' ratings were combined with the six other judges' ratings (see Tables C-1 and 4-5). Similarly, eleven of the twelve *V* coefficients were statistically significant when the ratings provided by Judge 4, 6, and 7 were removed. In comparison, only nine of the twelve *V* coefficients were statistically significant when all nine judges' ratings were included in the analyses.

This comparison reveals that, on the whole, Judges 4, 6, and 7 rated the proposed items to be less relevant to their intended domain than the remaining six judges. However, it should be noted that sufficient evidence of the content relevance of all 12 proposed items was produced when all nine judges' ratings were included in the analyses (see Table 4-5). That is, regardless of whether Judges 4, 6, and 7 were deemed to be discrepant raters, the 12 items were still deemed sufficiently relevant to their intended domains. Therefore, the importance of the labeling Judges 4, 6, and 7 as discrepant judges is minimized.

Appendix D

Judge-by-Item Content Relevance Rating Matrix

	Judge Number[a]								
Item #[b]	1	2	3	4	5	6	7	8	9
1	5	4	5	3	2	4	3	4	5
2	5	4	5	3	4	3	3	4	5
3	5	5	5	3	5	2	3	3	4
4	5	4	3	3	5	3	3	3	3
5	5	4	5	3	5	3	3	5	5
6	5	3	5	3	5	3	3	5	5
7	5	5	5	3	5	4	3	4	5
8	5	5	5	3	5	3	3	4	5
9	5	5	5	3	5	3	3	4	5
10	5	5	5	3	5	2	3	4	5
11	5	5	5	2	3	3	2	4	3
12	5	5	5	3	3	3	2	4	4

Note. Judges based their ratings on a 5-point scale (1 = *poor fit*; 5 = *excellent fit*).

[a] As indicated in Table 4-3

[b] As indicated in Table 4-5

Appendix E

Instrument Used to Assess Content Representativeness

Content Representation Assessment #1

Dimension Label and Domain Specification:

Doubts About Actions- These are statements that reflect the degree to which athletes are uncertain about, or dissatisfied with, their training in preparation for competition in their primary sport.

	Results of expert judges' content relevance ratings				
Item Set:	*M*	*SD*	*Mdn*	*Range*	*V*
I usually feel uncertain as to whether or not my training effectively prepares me for competition.	3.80	1.03	4.00	2-5	.70*
I usually feel unsure about the adequacy of my pre-competition practices.	4.00	.82	4.00	3-5	.75*
I usually have trouble deciding when I have practiced enough heading into a competition.	3.70	1.25	3.50	2-5	.68
Prior to competition, I rarely feel satisfied with my training.	3.60	.84	3.00	3-5	.65
I rarely feel that my training fully prepares me for competition.	4.20	.92	4.50	3-5	.80**
I rarely feel that I have trained enough in preparation for a competition.	4.20	1.03	5.00	3-5	.80**

* $p \leq .05$; ** $p \leq .01$

Questions:

1. Please rate the degree to which you feel the above item set covers (i.e., represents) Doubts About Actions as defined above. *When making your rating please only use the domain specification of Doubts About Actions and the above item set as references.*

Intended Domain	Poor Representation	Fair Representation	Good Representation	Very Good Representation	Excellent Representation
Doubts About Actions	☐	☐	☐	☐	☐

	Yes	No
2. Do you feel that any new items should be added to the set of items presented above to measure some aspect of the domain that may have been missed?	☐	☐

2a. If you answered "Yes" to the above question, in the space below please indicate the content of the domain that is not assessed by the item sets or provide an example of the item(s) that you feel should be added to the above set of items.

General Comments (e.g., comments re: the domain specifications of Doubts About Actions or the degree to which Doubts About Actions is relevant to sport-perfectionism):

Please complete the content-representation assessment on the next page. ☞

Content Representation Assessment #2

Dimension Label and Domain Specification:

Organization- These are statements that reflect athletes' tendencies or desires to establish and implement plans or routines that dictate their behavior prior to and during competition in their primary sport.

	Results of expert judges' content relevance ratings				
Item Set:	*M*	*SD*	*Mdn*	*Range*	*V*
On the day of competition I have a routine that I try to follow.	4.00	1.33	4.50	1-5	.75*
I have and follow a pre-competitive routine.	3.90	1.37	4.50	1-5	.72*
I follow pre-planned steps to prepare myself for competition.	4.10	.99	4.50	3-5	.78**
I follow a routine to get myself into a good mindset going into competition.	3.90	1.29	4.50	2-5	.72*
I develop plans that dictate how I want to perform during competition.	3.60	1.17	3.50	2-5	.65
I set plans that highlight the strategies I want to use when I compete.	3.80	1.03	4.00	2-5	.70*

* $p \leq .05$; ** $p \leq .01$

Questions:

1. Please rate the degree to which you feel the above item set covers (i.e., represents) Organization as defined above. *When making your rating please only use the domain specification of Organization and the above item set as references.*

Intended Domain	Poor Representation	Fair Representation	Good Representation	Very Good Representation	Excellent Representation
Organization	☐	☐	☐	☐	☐

	Yes	No
2. Do you feel that any new items should be added to the set of items presented above to measure some aspect of the domain that may have been missed?	☐	☐

2a. If you answered "Yes" to the above question, in the space below please indicate the content of the domain that is not assessed by the item sets or provide an example of the item(s) that you feel should be added to the above set of items.

General Comments (e.g., comments re: the domain specifications of Organization or the degree to which Organization is relevant to sport-perfectionism):

Thanks so much for participating in this item assessment process!! Please save your file and return it as an attachment to John Gotwals at jgotwals@ualberta.ca

Appendix F

Abbreviated Version of the Similarity Rating Scale

INSTRUCTIONS: Base your ratings on the similarity of the "*underlying concepts*" that you feel are inherent in each pair of statements. There are no right or wrong answers. Simply check the box/number that reflects the degree of similarity that you feel is present in each pair of items.

1. I usually feel uncertain as to whether or not my training effectively prepares me for competition.

vs.

I usually feel unsure about the adequacy of my pre-competition practices.

Not at all Similar								Very Similar
0	1	2	3	4	5	6	7	8
☐	☐	☐	☐	☐	☐	☐	☐	☐

2. I set plans that highlight the strategies I want to use when I compete.

vs.

Prior to competition, I rarely feel satisfied with my training.

Not at all Similar								Very Similar
0	1	2	3	4	5	6	7	8
☐	☐	☐	☐	☐	☐	☐	☐	☐

3. I develop plans that dictate how I want to perform during competition.

vs.

I rarely feel that my training fully prepares me for competition.

Not at all Similar								Very Similar
0	1	2	3	4	5	6	7	8
☐	☐	☐	☐	☐	☐	☐	☐	☐

4. I follow a routine to get myself into a good mindset going into competition.

vs.

I rarely feel that I have trained enough in preparation for a competition.

Not at all Similar								Very Similar
0	1	2	3	4	5	6	7	8
☐	☐	☐	☐	☐	☐	☐	☐	☐

5. I follow pre-planned steps to prepare myself for competition.

vs.

On the day of competition I have a routine that I try to follow.

Not at all Similar								Very Similar
0	1	2	3	4	5	6	7	8
☐	☐	☐	☐	☐	☐	☐	☐	☐

Please continue your similarity ratings on the next page. ☞

Appendix G

Verbatim Item Descriptions for Sport-MPS-2

A	B	
Personal Standards		
1.	1.	If I do not set the highest standards for myself in my sport, I am likely to end up a second-rate player.
6.	8.	I hate being less than the best at things in my sport.
14.	18.	It is important to me that I be thoroughly competent in everything I do in my sport.
16.	22.	I think I expect higher performance and greater results in my daily sport-training than most players.*
19.	24.	I feel that other players generally accept lower standards for themselves in sport than I do.
28.	34.	I have extremely high goals for myself in my sport.*
30.	37.	I set higher achievement goals than most athletes who play my sport.*
Concern Over Mistakes		
2.	2.	Even if I fail slightly in competition, for me, it is as bad as being a complete failure.
7.	10.	If I fail in competition, I feel like a failure as a person.*
12.	16.	The fewer mistakes I make in competition, the more people will like me.
21.	25.	I should be upset if I make a mistake in competition.
24.	29.	If a team-mate or opponent (who plays a similar position to me) plays better than me during competition, then I feel like I failed to some degree.
27.	33.	If I do not do well all the time in competition, I feel that people will not respect me as an athlete.*
32.	40.	People will probably think less of me if I make mistakes in competition.*
34.	43.	If I play well but only make one obvious mistake in the entire game, I still feel disappointed with my performance.
Perceived Parental Pressure		
3.	4.	My parents set very high standards for me in my sport.
5.	7.	In competition, I never feel like I can quite meet my parents' expectations.*
8.	11.	Only outstanding performance during competition is good enough in my family.
11.	15.	My parents have always had higher expectations for my future in sport than I have.
15.	20.	I feel like I am criticized by my parents for doing things less than perfectly in competition.*

A	B	
22.	26.	In competition, I never feel like I can quite live up to my parents' standards.*
25.	30.	My parents expect excellence from me in my sport.
31.	39.	I feel like my parents never try to fully understand the mistakes I make in competition.
33.	41.	My parents want me to be better than all other players who play my sport.
Perceived Coach Pressure		
4.	6.	I feel like my coach criticizes me for doing things less than perfectly in competition.*
10.	13.	Only outstanding performance in competition is good enough for my coach.*
n/a	17.	I feel like I can never quite meet my coach's expectations.
17.	23.	I feel like I can never quite live up to my coach's standards.*
23.	27.	My coach sets very high standards for me in competition.
26.	31.	My coach expects excellence from me at all times: both in training and competition.
29.	36.	I feel like my coach never tries to fully understand the mistakes I sometimes make.
Doubts About Actions		
n/a	3.	I usually feel uncertain as to whether or not my training effectively prepares me for competition.
n/a	12.	I usually feel unsure about the adequacy of my pre-competition practices.
n/a	14.	I rarely feel that my training fully prepares me for competition.
n/a	21.	Prior to competition, I rarely feel satisfied with my training.
n/a	32.	I rarely feel that I have trained enough in preparation for a competition.
n/a	38.	I usually have trouble deciding when I have practiced enough heading into a competition.
Organization		
n/a	5.	On the day of competition I have a routine that I try to follow.
n/a	9.	I have and follow and pre-competitive routine.
n/a	19.	I follow pre-planned steps to prepare myself for competition.
n/a	28.	I follow a routine to get myself into a good mindset going into competition.
n/a	35.	I develop plans that dictate how I want to perform during competition.
n/a	42.	I set plans that highlight the strategies I want to use when I compete.

Note. A = Original Sport-MPS item numbers; B = Sport-MPS2 item numbers; * = Subscale marker item.

Appendix H

The Multidimensional Perfectionism Scale

INSTRUCTIONS: The purpose of this questionnaire is to identify how people view certain aspects of their lives. Please help us to more fully understand how people view a variety of their experiences in life by indicating the extent to which you agree or disagree with the following statements. Please circle one response option to the right of each statement (please do not circle between response options). There are no right or wrong answers so please don't spend too much time on any one statement; simply choose the answer that best describes how you view each statement.

To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
1. My parents set very high standards for me.	SD	D	NA	A	SA
2. Organization is very important to me.	SD	D	NA	A	SA
3. As a child, I was punished for doing things less than perfect.	SD	D	NA	A	SA
4. If I do not set the highest standards for myself, I am likely to end up a second rate person.	SD	D	NA	A	SA
5. My parents never tried to understand my mistakes.	SD	D	NA	A	SA
6. It is important to me that I be thoroughly competent in everything that I do.	SD	D	NA	A	SA
7. I am a neat person.	SD	D	NA	A	SA
8. I try to be an organized person.	SD	D	NA	A	SA
9. If I fail at work/school, I am a failure as a person.	SD	D	NA	A	SA
10. I should be upset if I make a mistake.	SD	D	NA	A	SA
11. My parents wanted me to be the best at everything.	SD	D	NA	A	SA
12. I set higher goals than most people.	SD	D	NA	A	SA
13. If someone does a task at work/school better than I, then I feel like I failed the whole task.	SD	D	NA	A	SA
14. If I fail partly, it is as bad as being a complete failure.	SD	D	NA	A	SA
15. Only outstanding performance is good enough in my family.	SD	D	NA	A	SA
16. I am very good at focusing my efforts on attaining a goal.	SD	D	NA	A	SA
17. Even when I do something very carefully, I often feel that it is not quite right.	SD	D	NA	A	SA

Please complete the remaining items in this questionnaire on the next page. ☞

To what extent do you agree or disagree with the following statements?	Strongly Disagree	Disagree	Neither Agree Nor Disagree	Agree	Strongly Agree
18. I hate being less than the best at things.	SD	D	NA	A	SA
19. I have extremely high goals.	SD	D	NA	A	SA
20. My parents have expected excellence from me.	SD	D	NA	A	SA
21. People will probably think less of me if I make a mistake.	SD	D	NA	A	SA
22. I never felt like I could meet my parents' expectations.	SD	D	NA	A	SA
23. If I do not do as well as other people, it means I am an inferior human being.	SD	D	NA	A	SA
24. Other people seem to accept lower standards from themselves than I do.	SD	D	NA	A	SA
25. If I do not do well all the time, people will not respect me.	SD	D	NA	A	SA
26. My parents have always had higher expectations for my future than I have.	SD	D	NA	A	SA
27. I try to be a neat person.	SD	D	NA	A	SA
28. I usually have doubts about the simple everyday things that I do.	SD	D	NA	A	SA
29. Neatness is very important to me.	SD	D	NA	A	SA
30. I expect higher performance in my daily tasks than most people.	SD	D	NA	A	SA
31. I am an organized person.	SD	D	NA	A	SA
32. I tend to get behind in my work because I repeat things over and over.	SD	D	NA	A	SA
33. It takes me a long time to do something "right."	SD	D	NA	A	SA
34. The fewer mistakes I make, the more people will like me.	SD	D	NA	A	SA
35. I never felt like I could meet my parents' standards.	SD	D	NA	A	SA

Appendix I

Sport Anxiety Scale

INSTRUCTIONS: A number of statements that athletes have used to describe their thoughts and feelings before or during competition are listed below. Read each statement and then circle the appropriate response to the right of the statement to indicate how you generally feel prior to or during competition. There are no right or wrong answers so please don't spend too much time on any one statement; simply choose the answer that best describes how you commonly react before or during competition.

	How do you generally feel prior to or during competition?	Not At All	Somewhat So	Moderately So	Very Much So
1)	I feel nervous.	1	2	3	4
2)	During competition, I find myself thinking about unrelated things.	1	2	3	4
3)	I have self-doubts.	1	2	3	4
4)	My body feels tense.	1	2	3	4
5)	I get concerned that I may not do as well in competition as I could.	1	2	3	4
6)	I worry about what my teammates will think if I let them down.	1	2	3	4
7)	My mind wanders during competition.	1	2	3	4
8)	While performing, I often do not pay attention to what's going on.	1	2	3	4
9)	I feel tense in my stomach.	1	2	3	4
10)	Thoughts of doing poorly interfere with my thoughts during competition.	1	2	3	4
11)	I become concerned about choking under pressure.	1	2	3	4
12)	My heart races.	1	2	3	4
13)	I feel my stomach sinking.	1	2	3	4
14)	I worry about other people being disappointed with me.	1	2	3	4
15)	I get concerned about performing poorly.	1	2	3	4
16)	I have lapses of concentration because of nervousness.	1	2	3	4
17)	I sometimes find myself trembling before a game.	1	2	3	4

Please complete the remaining items in this questionnaire on the next page. ☞

	How do you generally feel prior to or during competition?	Not At All	Somewhat So	Moderately So	Very Much So
18)	I worry about reaching my goal.	1	2	3	4
19)	My body feels tight.	1	2	3	4
20)	I become concerned that others will be disappointed in my performance.	1	2	3	4
21)	My stomach gets upset before or during games.	1	2	3	4
22)	I worry about how the coach will view my performance.	1	2	3	4
23)	I get concerned that I won't be able to concentrate.	1	2	3	4
24)	My heart pounds before a game.	1	2	3	4
25)	I worry about spectators or friends forming a poor impression of me.	1	2	3	4

Appendix J

Evaluation of the Five-, Seven-, and Nine-Factor Sport-MPS-2 Solutions Produced in Chapter 7

Interpretation of the five-factor solution (see Table I-1) was difficult because the first factor was comprised of the eight COM-Sport items, the seven PS-Sport items, and a PPP-Sport item (item 41). Similarly, the second factor in this solution was also difficult to interpret given that it was a bipolar factor comprised of two PS-Sport items (items 22 and 34), the six ORG-Sport items, and one COM-Sport item (item 40). The seven- and nine-factor solutions also contained factors with questionable interpretability and/or stability. For example, the seventh factor in the seven-factor solution (see Table I-2) was a three-item factor comprised of three PCP-Sport items (items 13, 27, and 31), however item 13 had a cross-loading on a factor that was comprised of the five remaining PCP-Sport items. Similarly, the ninth factor in the nine-factor solution (see Table I-3) was comprised of two PPP-Sport items (items 4 and 41) and one COM-Sport item (item 25), and all three items had meaningful loadings on other factors. Due to (a) the enhanced interpretability of the six-factor solution over the five-, seven-, and nine-factor solutions, and (b) the fact that six-factors have been found in previous research (see Chapter 6 and Dunn, Gamache, et al., 2006), the six-factor solution (see Table 7-2) was chosen as the best representation of the Sport-MPS-2 data.

Table J-1

Pattern Coefficients for a Five-Factor Principal Axes Analysis of Sport-MPS-2 Data

		Factor number				
Item #	Intended subscale	1	2	3	4	5
1.	PS-Sport	**.38**	.03	.12	.10	-.10
8.	PS-Sport	**.55**	.21	.05	.04	-.05
18.	PS-Sport	**.33**	.29	-.04	.13	.05
22.	PS-Sport	**.34**	**.40**	-.07	-.14	-.04
24.	PS-Sport	**.40**	.20	-.07	-.09	.08
34.	PS-Sport	**.38**	**.48**	-.08	-.09	-.02
37.	PS-Sport	**.46**	.28	-.02	-.00	-.16
2.	COM-Sport	**.43**	.02	.09	.07	.05
10.	COM-Sport	**.44**	-.04	.12	.17	.08
16.	COM-Sport	**.52**	-.15	.19	.08	-.01
25.	COM-Sport	**.34**	.06	.12	.01	-.00
29.	COM-Sport	**.47**	-.04	-.16	.10	.16
33.	COM-Sport	**.53**	-.11	.04	.20	.18
40.	COM-Sport	**.58**	**-.32**	.03	.24	.09
43.	COM-Sport	**.48**	-.06	-.04	-.09	.25
4.	PPP-Sport	.12	.12	**.65**	-.03	-.13
7.	PPP-Sport	-.20	.01	**.58**	.01	.26
11.	PPP-Sport	.03	.03	**.75**	.05	.05
15.	PPP-Sport	.02	-.09	**.61**	.10	-.04
20.	PPP-Sport	-.07	.03	**.80**	-.05	.12
26.	PPP-Sport	-.11	-.12	**.80**	.02	.16
30.	PPP-Sport	.15	.12	**.70**	-.06	-.13
39.	PPP-Sport	.04	-.07	**.53**	.06	.13
41.	PPP-Sport	**.33**	-.01	**.48**	-.08	-.03

Table J-2 (Continued)

		Factor number				
Item #	Intended subscale	1	2	3	4	5
6.	PCP-Sport	-.05	.03	.05	**.67**	.01
13.	PCP-Sport	.15	.10	-.01	**.63**	-.06
17.	PCP-Sport	-.04	-.04	-.04	**.83**	.16
23.	PCP-Sport	-.08	-.08	.06	**.88**	.02
27.	PCP-Sport	.17	.13	.01	**.44**	.06
31.	PCP-Sport	.09	.10	.08	**.50**	-.16
36.	PCP-Sport	-.00	-.02	-.13	**.62**	.13
3.	DAA-Sport	.05	.06	-.01	.01	**.49**
12.	DAA-Sport	.16	-.05	.04	.09	**.52**
14.	DAA-Sport	-.09	.05	.14	.03	**.54**
21.	DAA-Sport	.06	-.03	.06	.00	**.70**
32.	DAA-Sport	-.00	.07	.07	-.08	**.74**
38.	DAA-Sport	.13	-.09	-.07	.17	**.41**
5.	ORG-Sport	-.11	**.83**	.01	.15	-.01
9.	ORG-Sport	-.08	**.84**	.04	.10	.04
19.	ORG-Sport	-.20	**.88**	.01	.17	.00
28.	ORG-Sport	-.06	**.83**	-.06	.08	.03
35.	ORG-Sport	.13	**.51**	.02	-.11	-.04
42.	ORG-Sport	.08	**.53**	.08	-.12	.02

Note. Pattern coefficients ≥ |.30| are in bold. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

Table J-2

Pattern Coefficients for Seven-Factor Principal Axes Analysis of Sport-MPS-2 Data

		Factor number						
Item #	Intended subscale	1	2	3	4	5	6	7
1.	PS-Sport	.21	-.06	.13	.12	-.09	**.30**	-.05
8.	PS-Sport	**.37**	.12	.03	-.06	-.01	**.31**	-.19
18.	PS-Sport	.19	.20	-.06	.01	.10	.21	-.24
22.	PS-Sport	-.00	.16	-.04	-.10	.01	**.54**	-.04
24.	PS-Sport	.04	-.05	-.03	.02	.10	**.59**	.06
34.	PS-Sport	-.07	.16	-.03	-.03	.04	**.71**	-.06
37.	PS-Sport	.04	-.01	.04	.10	-.14	**.70**	-.01
2.	COM-Sport	**.46**	.05	.07	.12	-.03	.15	.15
10.	COM-Sport	**.53**	.05	.09	.14	.02	.03	.04
16.	COM-Sport	**.62**	-.04	.13	-.04	-.03	-.04	-.10
25.	COM-Sport	**.41**	.13	.07	-.09	-.01	-.01	-.07
29.	COM-Sport	**.34**	-.08	-.17	.08	.16	.22	-.05
33.	COM-Sport	**.64**	.01	-.02	.08	.15	-.05	-.10
40.	COM-Sport	**.76**	-.15	-.03	.16	.02	-.11	-.03
43.	COM-Sport	**.42**	-.06	-.06	-.10	.23	.14	.02
4.	PPP-Sport	-.01	.02	**.65**	-.12	-.05	.13	-.22
7.	PPP-Sport	-.10	.03	**.59**	.13	.20	-.07	.22
11.	PPP-Sport	-.01	-.02	**.76**	.09	.05	.10	.01
15.	PPP-Sport	-.08	-.17	**.63**	.04	.03	.06	-.20
20.	PPP-Sport	.06	.07	**.79**	.02	.07	-.08	.16
26.	PPP-Sport	.09	-.01	**.77**	.05	.11	-.23	.10
30.	PPP-Sport	.04	.03	**.69**	-.20	-.04	.09	-.29
39.	PPP-Sport	.20	.02	**.51**	.10	.08	-.12	.12
41.	PPP-Sport	**.30**	-.02	**.46**	-.08	-.04	.12	.02

Table J-2 (Continued)

		Factor number						
Item #	Intended subscale	1	2	3	4	5	6	7
6.	PCP-Sport	.04	.09	.07	**.68**	-.05	-.02	-.02
13.	PCP-Sport	.09	.08	-.01	**.43**	.00	.04	**-.42**
17.	PCP-Sport	-.00	-.01	-.01	**.84**	.11	.01	-.10
23.	PCP-Sport	.02	-.02	.09	**.90**	-.04	-.05	-.08
27.	PCP-Sport	.02	.05	-.01	.15	.20	.03	**-.66**
31.	PCP-Sport	.04	.09	.06	.20	-.06	-.08	**-.65**
36.	PCP-Sport	-.05	-.04	-.09	**.68**	.09	.11	-.02
3.	DAA-Sport	.03	.04	-.01	.00	**.50**	.01	-.01
12.	DAA-Sport	.11	-.07	.03	.07	**.53**	.03	-.06
14.	DAA-Sport	-.17	-.02	.14	.02	**.59**	.01	-.08
21.	DAA-Sport	.11	-.01	.04	-.00	**.69**	-.08	.02
32.	DAA-Sport	-.05	.01	.07	-.06	**.76**	.09	.03
38.	DAA-Sport	.19	-.04	-.08	.18	**.37**	-.05	.05
5.	ORG-Sport	.04	**.86**	-.02	.04	-.03	-.04	-.05
9.	ORG-Sport	.02	**.85**	.00	-.05	.05	-.02	-.14
19.	ORG-Sport	-.05	**.90**	-.02	.10	-.04	-.02	.01
28.	ORG-Sport	.04	**.82**	-.08	.01	-.00	.06	.00
35.	ORG-Sport	-.08	**.32**	.05	-.02	-.04	**.42**	.09
42.	ORG-Sport	-.05	**.39**	.09	-.04	-.00	**.32**	.12

Note. Pattern coefficients ≥ |.30| are in bold. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

Table J-3

Pattern Coefficients for a Nine-Factor Principal Axes Analysis of Sport-MPS-2 Data

Item #	Intended subscale	Factor number								
		1	2	3	4	5	6	7	8	9
1.	PS-Sport	.15	-.12	.08	.15	-.07	.14	-.05	.25	-.25
8.	PS-Sport	**.30**	.14	.00	-.02	.01	.27	-.14	.05	-.25
18.	PS-Sport	.18	.14	-.05	-.03	.07	.15	**-.30**	.18	.00
22.	PS-Sport	.02	.19	.01	-.12	-.03	**.68**	-.03	-.05	.13
24.	PS-Sport	.06	-.03	-.01	.03	.09	**.62**	.07	.03	.03
34.	PS-Sport	-.06	.13	-.03	-.04	.02	**.62**	-.09	.21	.00
37.	PS-Sport	.02	-.01	.02	.11	-.14	**.60**	-.01	.18	-.12
2.	COM-Sport	**.45**	.06	.08	.11	-.03	.16	.12	.04	-.01
10.	COM-Sport	**.56**	.06	.13	.10	-.01	.09	-.01	-.02	.09
16.	COM-Sport	**.58**	-.01	.14	-.04	-.03	-.01	-.10	-.04	-.13
25.	COM-Sport	**.32**	.10	-.02	-.04	.05	-.20	-.03	.19	**-.44**
29.	COM-Sport	**.32**	-.08	-.17	.09	.17	.18	-.05	.05	-.10
33.	COM-Sport	**.64**	-.01	.00	.03	.12	-.04	-.18	.04	.03
40.	COM-Sport	**.75**	-.12	-.00	.13	.01	-.06	-.07	-.07	-.01
43.	COM-Sport	**.39**	-.04	-.06	-.08	.24	.14	.03	.00	-.10
4.	PPP-Sport	-.09	.05	**.60**	-.07	-.02	.10	-.15	-.02	**-.32**
7.	PPP-Sport	-.08	-.03	**.58**	.12	.20	-.15	.15	.18	.04
11.	PPP-Sport	-.02	-.00	**.74**	.10	.06	.11	.03	-.01	-.09
15.	PPP-Sport	-.08	-.17	**.62**	.02	.01	.06	-.22	.01	-.02
20.	PPP-Sport	.09	.04	**.80**	-.02	.04	-.07	.10	.09	.08
26.	PPP-Sport	.14	-.02	**.81**	.00	.08	-.16	.04	-.02	.14
30.	PPP-Sport	-.03	.08	**.66**	-.16	-.02	.12	-.22	-.09	-.26
39.	PPP-Sport	.27	.01	**.58**	.03	.02	-.04	.04	-.01	.25
41.	PPP-Sport	.22	.03	**.42**	-.01	.01	.10	.11	-.03	**-.33**

Table J-3 (Continued)

Item #	Intended subscale	Factor number 1	2	3	4	5	6	7	8	9
6.	PCP-Sport	.02	.12	.05	**.74**	-.02	-.04	.05	-.07	-.12
13.	PCP-Sport	.06	.11	-.02	**.43**	.00	.05	**-.38**	-.09	-.09
17.	PCP-Sport	.04	-.01	.01	**.79**	.09	-.00	-.14	-.01	.13
23.	PCP-Sport	.08	-.02	.12	**.84**	-.07	-.04	-.13	-.02	.20
27.	PCP-Sport	.04	.02	.01	.05	.15	.07	**-.78**	-.03	.15
31.	PCP-Sport	.01	.04	.04	.16	-.08	-.14	**-.69**	.06	-.07
36.	PCP-Sport	-.06	-.04	-.12	**.71**	.11	.04	-.00	.05	-.04
3.	DAA-Sport	.04	.04	-.00	.01	**.48**	.03	-.02	-.02	.06
12.	DAA-Sport	.07	-.03	.00	.12	**.57**	.04	.01	-.09	-.16
14.	DAA-Sport	-.20	.03	.12	.07	**.63**	.04	-.00	-.12	-.11
21.	DAA-Sport	.12	-.01	.05	.00	**.67**	-.06	.00	-.03	.05
32.	DAA-Sport	-.04	-.06	.06	-.07	**.75**	-.07	-.04	.19	.07
38.	DAA-Sport	.25	-.07	-.04	.12	**.33**	-.03	-.04	.06	.22
5.	ORG-Sport	.03	**.89**	.00	.04	-.03	.04	-.01	-.04	.04
9.	ORG-Sport	.01	**.88**	.03	-.05	.04	.07	-.09	-.07	.04
19.	ORG-Sport	-.08	**.82**	-.02	.10	-.03	-.06	.00	.19	-.00
28.	ORG-Sport	-.00	**.79**	-.09	.04	.02	.03	.04	.11	-.08
35.	ORG-Sport	-.08	.12	.03	-.07	-.08	.19	-.05	**.67**	.09
42.	ORG-Sport	-.08	.22	.06	-.06	-.00	.07	.02	**.60**	-.05

Note. Pattern coefficients ≥ |.30| are in bold. PS-Sport = Personal standards; COM-Sport = Concern over mistakes; PPP-Sport = Perceived parental pressure; PCP-Sport = Perceived coach pressure; DAA-Sport = Doubts about actions; ORG-Sport = Organization.

Appendix K

Bivariate Correlations Between Sport-MPS-2 and SAS Subscales

	Instrument								
	Sport-MPS-2						SAS		
Subscale	PS	ORG	COM	PPP	PCP	DAA	WOR	SOM	CD
PS									
ORG	.47***								
COM	.40***	.04							
PPP	.14	.02	.28***						
PCP	.19**	.06	.36***	.14					
DAA	.05	-.13	.35***	.24***	.29***				
WOR	.21**	-.01	.56***	.20**	.47***	.31***			
SOM	.12	.11	.28***	.13	.30***	.23**	.47***		
CD	-.13	-.18*	.29***	.06	.21**	.31***	.40***	.26***	

Note. * $p \leq .05$; ** $p \leq .01$, *** $p \leq .001$. PS = Personal Standards; ORG = Organization; COM = Concern Over Mistakes; PPP = Perceived Parental Pressure; PCP = Perceived Coach Pressure; DAA = Doubts About Actions; WOR = Worry; SOM = Somatic Anxiety; CD = Concentration Disruption

Appendix L

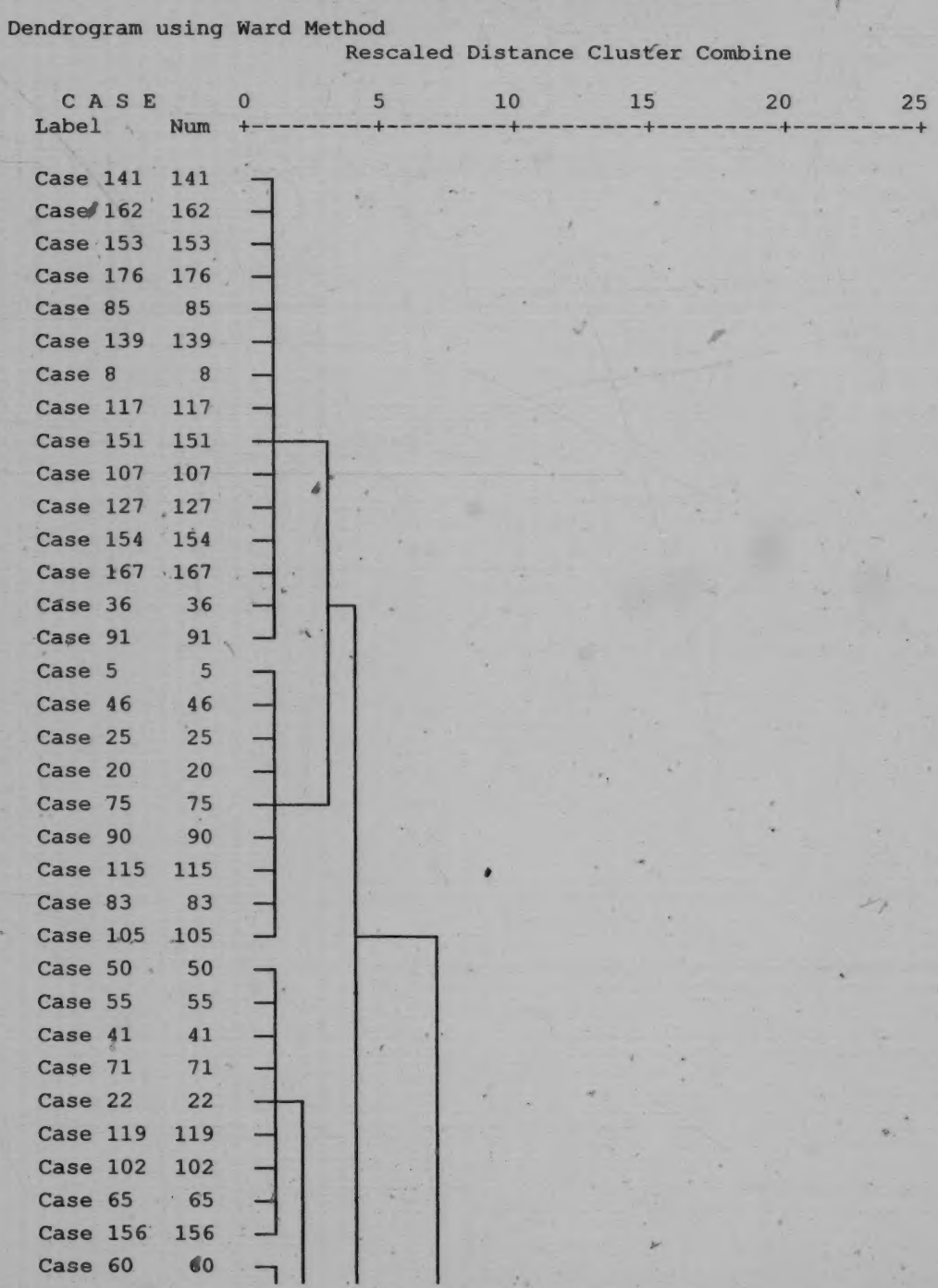
Pattern Coefficients for Three-Factor Subscale-Level Principal Axis Factor Analysis of Sport-MPS-2 and Frost-MPS Subscales with Varimax Rotation

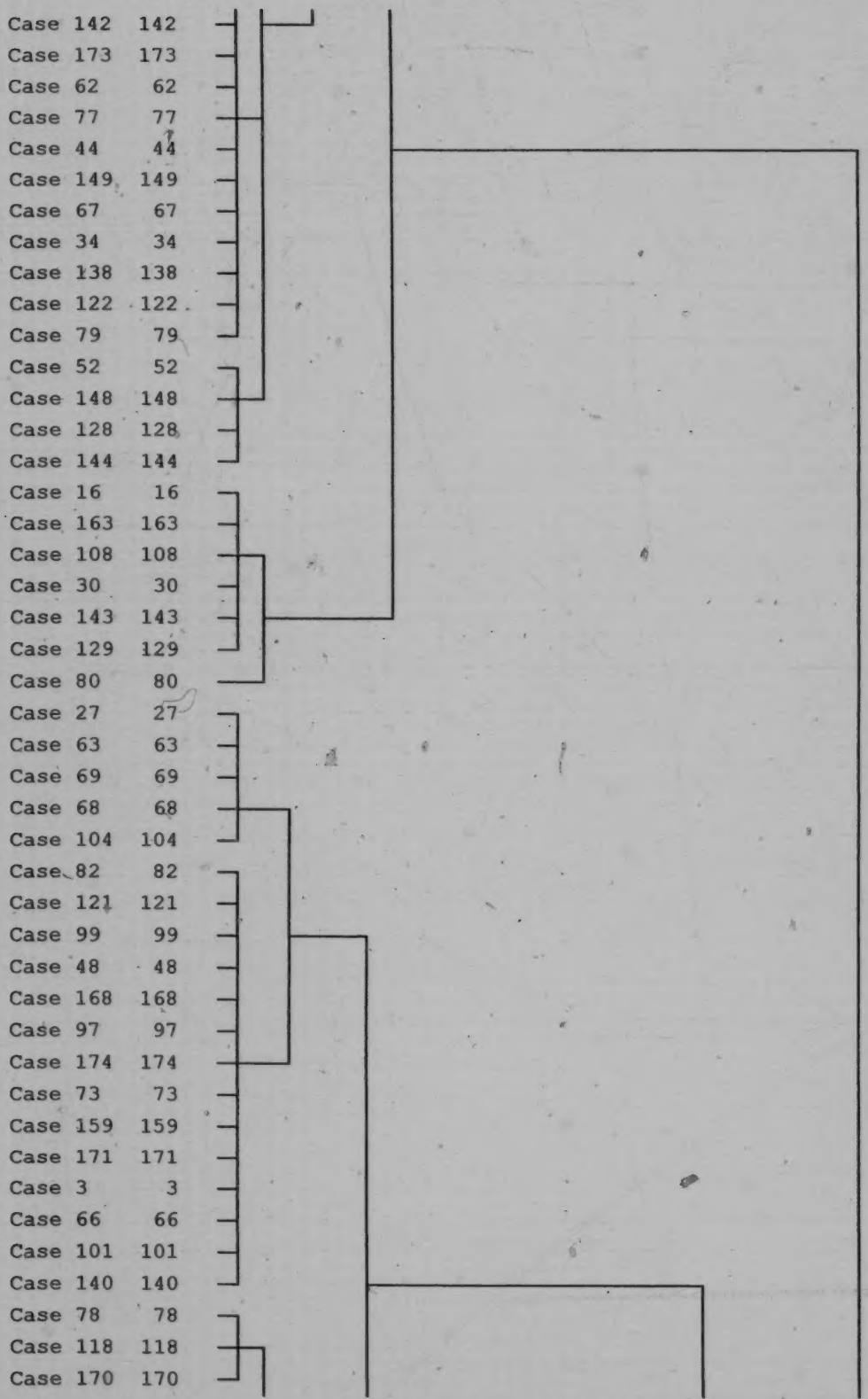
		Factor		
Subscale	Instrument	F_1	F_2	F_3
Personal Standards	Sport-MPS-2	**.32**	**.73**	.07
Organization	Sport-MPS-2	-.07	**.62**	.02
Concern Over Mistakes	Sport-MPS-2	**.76**	.19	.13
Perceived Parental Pressure	Sport-MPS-2	.22	.00	**.84**
Perceived Coach Pressure	Sport-MPS-2	**.46**	.05	.06
Doubts About Actions	Sport-MPS-2	**.53**	-.19	.12
Personal Standards	Frost-MPS	.20	**.77**	.08
Organization	Frost-MPS	-.17	**.46**	-.03
Concern and Doubts About Mistakes	Frost-MPS	**.79**	.04	.25
Perceived Parental Pressure	Frost-MPS	.18	.09	**.85**

Note. Pattern coefficients ≥ |.30| are in bold.

Appendix M

SPSS Output of the Cluster-Formation Dendrogram Produced from Hierarchical Cluster Analysis of Mean Item Sport-MPS-2 Subscale Scores

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Case 128 128
Case 144 144
Case 16 16
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Case 108 108
Case 30 30
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Case 63 63
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Case 68 68
Case 104 104
Case 82 82
Case 121 121
Case 99 99
Case 48 48
Case 168 168
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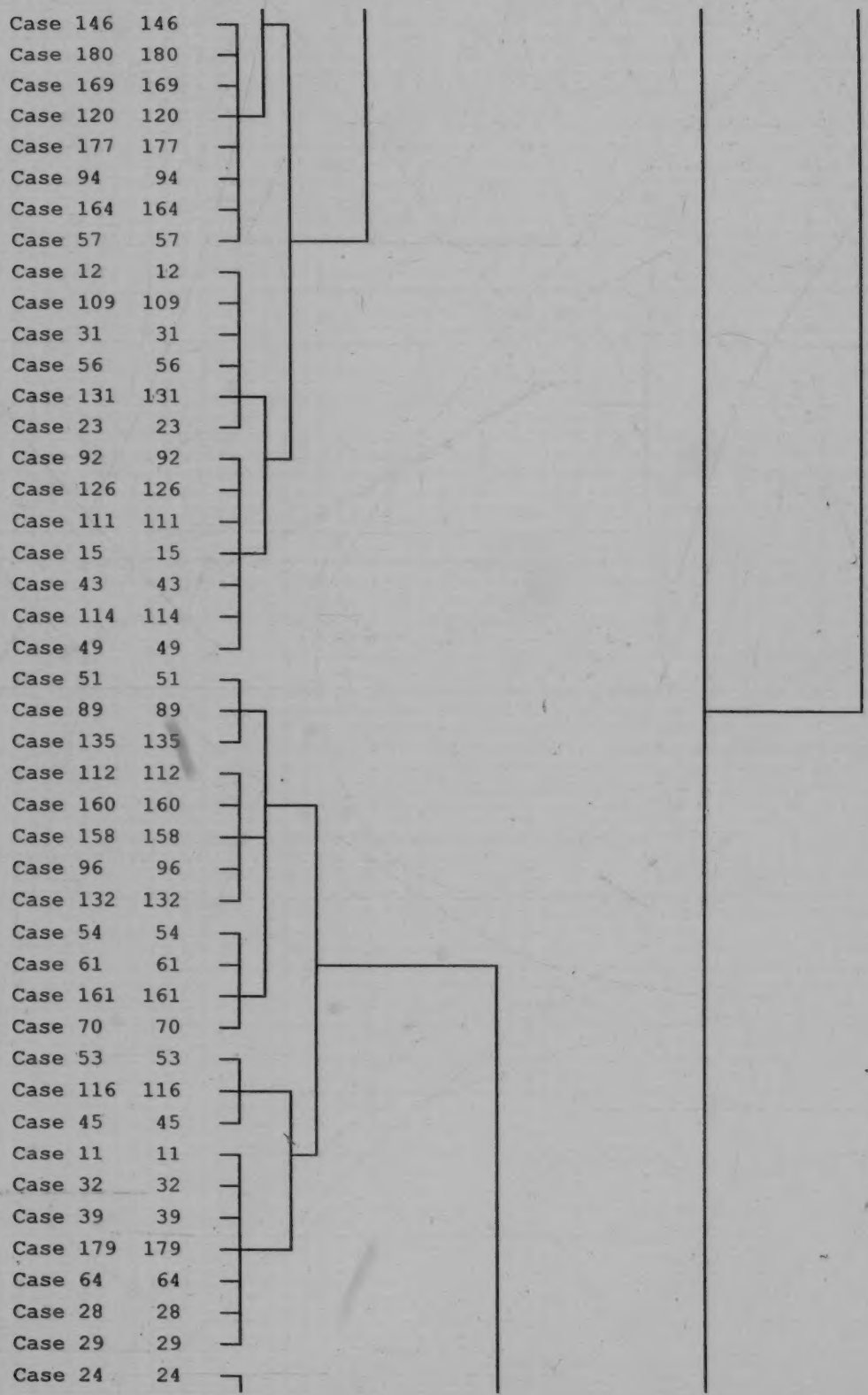
Case 159 159
Case 171 171
Case 3 3
Case 66 66
Case 101 101
Case 140 140
Case 78 78
Case 118 118
Case 170 170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Case 164 164
Case 57 57
Case 12 12
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Case 92 92
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Case 111 111
Case 15 15
Case 43 43
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Case 89 89
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Case 161 161
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Case 53 53
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Case 45 45
Case 11 11
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Case 39 39
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Case 64 64
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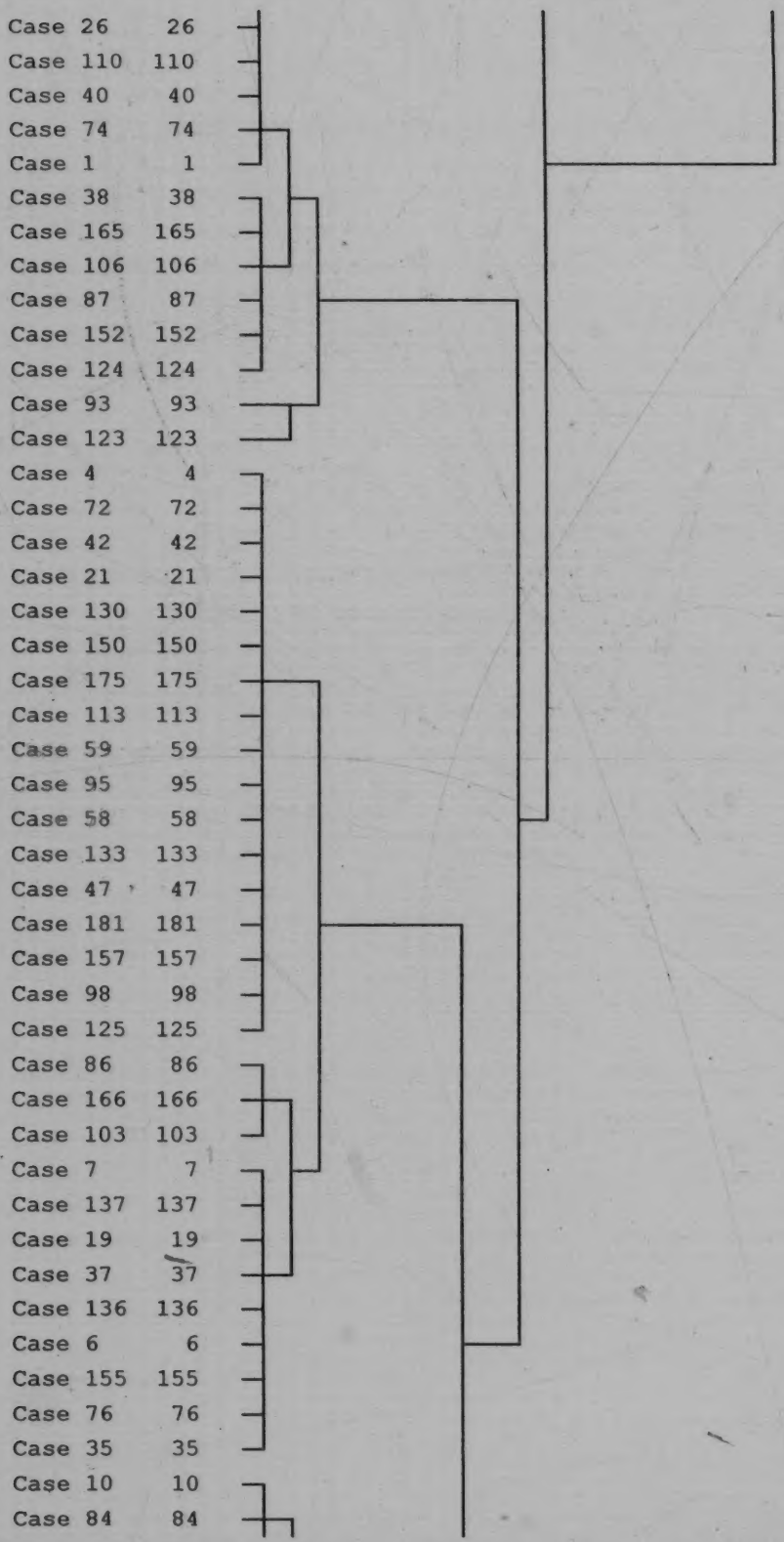
Case 24 24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Case 58 58
Case 133 133
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Case 181 181
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Case 98 98
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Case 166 166
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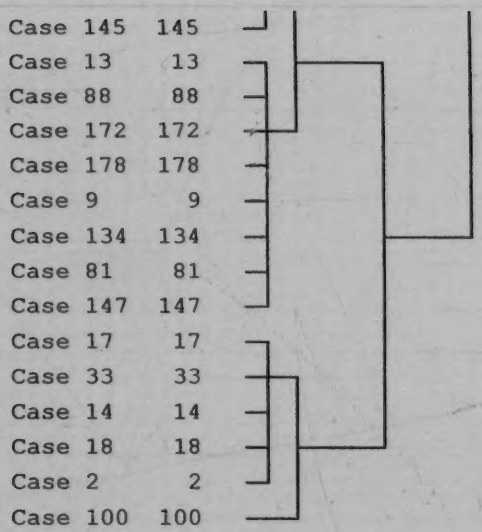
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Case 2 2
Case 100 100